

STATEMENT OF FINDING

Hoobert Environmental Analysis

6-6-06

I. Selection of an Alternative

The Montana Department of Natural Resources and Conservation (DNRC), Anaconda Unit, is proposing to harvest approximately 6.25 Million Board Feet (MMBF) of sawlog timber from 5 separate tracts of Trust Land. The proposed sale area is located in the Bert Cr., Hoover Cr., and Gough Cr. Drainages. Which are located between 5 and 11 miles east of Drummond Montana in sections 14, 16, 22, and 36 Township 11 North, Range 11 West, and section 36 Township 11 North, Range 12 West. Section 36, T11N R12W, is located in Granite County, while the remainder of the sections are in Powell County.

School Trust Lands in these tracts contains approximately 2,967 acres. The action alternative proposes to conduct harvesting on 1,300 acres of timberland within this ownership. The State's land is intermixed with private ranches, and Stimpson Timber Co. holdings. All 5 of these tracts are leased to various ranches for domestic livestock grazing. These tracts are accessed by low to medium standard dirt roads, which are controlled by the adjacent private landowners. DNRC currently has partial permanent easements to the 4 tracts, in the Gough and Hoover Creek Drainages. The remainder of the permanent easements in these two drainages have been applied for from Stimpson Lumber Co.

Silvicultural treatments proposed under the action alternative would typically target smaller diameter intermediate and co-dominate trees with larger, less healthy for harvest. Large diameter Ponderosa Pine and some of the better-formed Douglas fir are planned for retention. Emphasis is being placed on keeping larger diameter trees to maintain structural and species diversity, encourage ponderosa pine regeneration and the regeneration of other seral species, such as aspen and willows.

If the action alternative were selected, up to three sales would be sold. The first of these would likely occur in fiscal year 2007, which begins July 1 of 2006 and with additional sales occurring through 2008. Each timber sale contract could have up to two years duration. In addition another two years for each sale would be required to accomplish site preparation and hazard reduction work.

II. Objectives

The Department has developed the following specific project objectives:

1. Harvest 5.0 to 8.0 MMBF of timber to provide continuing income for the Montana School Equalization Account in a manner consistent with sustained-yield management principles.
2. Promote long-term production of timber for generating revenue to the Montana School Equalization Account.
3. Maintain the DNRC ownership in an ecological condition, which is sustainable and provides for a wide variety of resources to generate future income.
4. Return the stands to stocking levels and fuel loads closer to historical levels and creating healthier stands.

III. Decisions to be made

The following decisions are to be made as a result of this Environmental Assessment:

1. Does the proposed alternative meet stated project objectives
2. Which alternative should be selected
3. Does the selected alternative have significant impacts on the environment

4. Is there need for further analysis (preparation of an EIS)

IV. Scoping, Public Involvement

Comments from the general public and specialists (both inside and outside DNRC) were solicited as part of this E.A. Scoping notices were sent in March, of 2004. In addition a legal notice was placed in the weekly Philipsburg Mail.

V. Issues and Mitigations

Issues were identified from concerns and comments expressed by individuals, special interest groups, plus internal and external agency specialists. The following four issues were identified and studied in detail in combined chapters 3 and 4 of the environmental document. Another 8 concerns were identified and addressed in chapter 1. These concerns were not carried through the combined chapters 3 & 4.

1. The proposed action might cause impacts to Threatened, Endangered and Sensitive Species.

Potential impacts associated with both the action and no action alternatives were analyzed for the following species. Bald Eagle, Grizzly Bear, Wolf, Lynx, Flammulated Owl, Pileated Woodpecker, Long eared owl, Cooper's Hawk, and Northern Goshawk. The following species of concern were analyzed but eliminated from further study: Fischer, Black-backed woodpecker, Townsend's Big-eared Bat, Common Loon, Northern Bog Lemming, Columbian Sharp-tailed Grouse, Coeur d'Alene Salamander, Mountain Plover, and Harlequin Duck. There are no significant impacts anticipated under the action alternative as long as the following mitigation measures were to be implemented.

- a. Bald Eagles
Should a bald eagle nest be discovered near Miller Lake, and within 0.5 miles of the proposed haul roads, mitigation measures (e.g. ARM 36.11.429) would be implemented after consultation with a DNRC wildlife biologist, or alternative haul routes would be located to minimize disturbance during the breeding season.
- b. Grizzly Bears
All new roads on School Trust Lands within the sale area would be closed to motorized vehicles. After consultation with DNRC's biologist
- c. Wolves
All new roads on School Trust Lands within the sale area would be closed to motorized vehicles. After consultation with a DNRC Biologist
- d. Lynx
No mitigation measures required.
- e. Flammulated Owl
No mitigation measures required
- e. Pileated Woodpeckers
The existing Pileated nesting habitat is fragmented outside of the large block of BLM to the north and east of the project area. Small islands of habitat occur within the cumulative affects analysis area mainly on agency land. The action alternative will remove some of those islands and reduce suitable habitat forces pairs to other islands or to the main block of BLM land. This impact will continue for 40-60 years when the lands adjacent to the project area recover enough to provide adequate habitat. To mitigate the harvesting one snag and recruit of the largest size class available per acre would be retained.
- g. Long-eared owl
No mitigation measures required
- h. Cooper's Hawk
If and active nest is located within the project area, a five to 10 acre zone be implemented around the nest where limited harvesting could occur. A DNRC wildlife biologist would be contacted for site-specific mitigations.

- i. Northern Goshawk
In the Gough Creek parcel a 30 ac. equipment restriction zone (ERZ), which surrounds two goshawk nests would be installed. The ERZ would retain the nest stand characteristics this goshawk territory is familiar with, and prevent the two nest trees from being harvested. In addition new road construction in the Gough Creek parcel would be routed to minimize potential disturbance to the nesting hawks.
 - j. If any threatened, endangered or sensitive species were encountered during project planning or implementation. Project related activities would cease until a DNRC wildlife biologist and the project leader determine if additional habitat protection measures were needed.
- 2. **The proposed action may cause stream sedimentation, which could adversely affect water quality. The following mitigation measures address both of these concerns.**
 - a. No trees would be harvested in or near the springs located in Kelly Creek. An ERZ would be identified around these springs. In addition there is a spring and channel in the SW1/4SW1/4 section 14 which would also have an ERZ identified.
 - b. All SMZ rules and BMP stipulations would be complied with.
 - c. Install site-specific mitigation measures to reduce sediment transport to streams.
 - d. Ground based harvesting is limited to slopes of less than 45%
 - e. In the Elk Swamp Creek drainage hauling would be restricted to dry or frozen conditions.
 - f. Use designated skid trails and equipment restriction zones to avoid damage to areas with springs, seeps, ephemeral draws and/or sensitive soils.
- 3. **The proposed action may adversely affect Bull Trout and Westslope Cutthroat. The following mitigation measures address both of these concerns.**
 - a. Implementation of the site-specific mitigations for sediment transport
 - b. Implement BMP and SMZ stipulations
- 4. **Timber harvesting might adversely impact winter big game populations. The following mitigation measures would be implemented as part of alternative B.**
 - a. Defer harvest on approximately 9 acres, in Bert Cr., of timber in the northeast corner the parcel
 - b. Approximately 80-100 square feet of basal area per acre post-harvest would be retained in the NE1/4 of the Bert Cr. Tract..
 - c. Retain a travel corridor for mule deer and elk along Limestone Ridge
 - d. Defer approximately 91 acres along Gough Creek and a tributary that runs from the northwest into the creek.
 - e. Delineate approximately 42 acres along an ephemeral draw of heavier tree retention, post harvest.
- 5. **Additional mitigation measures**
 - a. Emphasize the retention of large diameter Ponderosa pine for seed source, species diversity and potential future snag recruits.
 - b. All road construction and harvesting equipment would be cleaned to prevent possible introduction of noxious weeds. Equipment would be subject to inspection by the forest officer prior to moving equipment onsite.
 - c. Spot spraying of herbicides to eradicate State listed noxious weeds by a certified applicator according to herbicide label directions and in accordance with applicable laws and rules of the Granite and Powell County Weed Boards and the State of Montana.
 - d. Snags would be retained as would green, cull trees for future snag recruitment where appropriate
 - e. Prompt revegetation through grass seeding newly disturbed soils on road cuts and fills slopes.
 - f. Skidding operations would be limited to the following conditions.
Frozen or dry conditions

12"-18" loose, or 8" compacted snow cover.
Soil moisture at 4"-6" depth is 20% or less

VI. Alternatives

Alternative A - No Action

This alternative would retain all current tree cover. Continued tree growth, with declining individual tree radial growth and vigor would be expected. Seral species such as Ponderosa pine and aspen would continue to decline in vigor and numbers while Douglas fir would dominate the stands even more. There would be an increasing chance of stand replacing wildfire due to increasing ladder fuels, with subsequent loss of revenue to the school trust and additional environmental impacts. An increase in susceptibility to insect and disease outbreaks would also be expected.

No new roads would be built and existing substandard roads and drainage features would not receive remedial measures to decrease sediment delivery to watercourses. There would be less ground disturbance in close proximity to waterways, reducing potential sediment sources.

Alternative B – Proposed Action

Alternative B would selectively harvest approximately 6.25 MMBF from approximately 1,300 acres. With 10.81 miles of new road construction to access the proposed treatment areas. New roads would be closed or partially obliterated upon completion of the project activities.

One of the goals of this alternative is to regenerate mature stands and to encourage the seral species such as Ponderosa pine, aspen and willow to become better established and expand their presence. Existing Ponderosa pine are typically in poor condition and are being out-competed by Douglas fir. Retention of most large diameter pine and some fir would provide variable stand structure, snag recruitment and move the sites toward historic conditions. This alternative would include maintenance of access roads on private and State lands, which would reduce sediment delivery to streams in the project area.

VII. Selected Alternative

After reviewing the Environmental analysis, I have decided to proceed with **Alternative B, the action alternative**. I have selected this alternative for the following reasons:

1. **Financial Return** - The five tracts of land identified in the Environmental Analysis currently generate annual revenue of approximately \$1,684 per year from grazing leases to three different lessees. Under the no action alternative there would be a minor upward change in this revenue in the foreseeable future, due to the inflation of cattle prices. In addition the action alternative would generate approximately \$1,200,000 over the next 3 years for the common school trust. Timber harvesting will not decrease revenues from the leases and may slightly increase them due to additional forage production.
2. **Long-term production of timber** - The proposed sale is designed to move current age class distribution toward more historic conditions, returning the managed stands to improved stability. Existing heavy tree stocking levels are causing stress, mortality and increasing the potential for stand replacing fire occurrence. The action alternative would thin overstocked stands and promote regeneration leading to a healthier more productive forest which is less susceptible to stand replacing fires and insect damage.
3. **Maintain an ecologically sustainable condition** – Improvement of existing roads to reduce sediment delivery to streams, retention of coarse woody debris for nutrient cycling, and improving stand condition health would increase growth rates and help to maintain and improve resource conditions within the

Trust Lands. Retaining trees in a wide range of diameter classes would provide structural and species diversity.

4. **Stocking levels and fuel loads** – The stand density would be reduced in a substantial portion of the tracts. This would have a positive impact on the health of remaining trees along with increasing between tree spacing and reducing the potential for stand replacement (crown) fires.

VIII. Finding

After reviewing the information provided in this environmental assessment, I have concluded that no significant impacts will occur from implementation of Alternative B, the action alternative. There is no need for an environmental impact statement. While this alternative will modify the vegetative components within these 5 tracts of land, the changes will move them toward a status that more closely approaches their historical, pre-settlement, conditions. In addition, this alternative will generate a substantial income for the Common School Trust. This alternative meets the objectives identified at the beginning of the E.A. better than the No Action Alternative. **Alternative B is the selected alternative.**

Decision Maker
Fred Staedler Jr.
Anaconda Unit Manager

Date:

HOOBERT

Environmental Assessment



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May 23, 2006

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1.0 PURPOSE AND NEED

1.1 PROPOSED ACTION

The Department of Natural Resources and Conservation (DNRC), Southwestern Land Office, Anaconda Unit, proposes to harvest timber from State owned Common School Trust Lands in parts of five sections, Northeast of Drummond, MT. The proposed project area encompasses 2,967 acres within Sections 14 (Hoover 14), 16 (Hoover 16), 22 (Hoover 22) and 36 (Gough Creek), T11N, R11W located in Powell County; and Section 36 (Bert Creek), T11N, R12W located in Granite County. The proposal would target approximately 1,300 acres for harvest, removing between 5.0 and 8.0 million board feet within portions of those sections. Proposal maps and a vicinity map indicating the general location of the proposed project area are shown in Attachments A-1 through A-4.

If the action alternative is selected, up to three sales could be sold from this EA. The sales would be sold between 2006 and 2008. Each timber sale contract could have up to two years duration. Associated hazard reduction and site preparation work could continue for up to two additional years.

1.2 PURPOSE AND NEED FOR ACTION

School Trust Lands are held by the State of Montana in trust for the support of beneficiary institutions such as public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the Department of Natural Resources and Conservation are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return, over the long run, for these beneficiary institutions (Section 77-1-202, MCA). The Board and the Department have broad discretion as to the best way to satisfy this legal mandate, subject to applicable state and federal law. For the lands involved in this project, the Department believes that management for timber is the best way to satisfy this legal mandate for the foreseeable future. Lands involved in this project are held in support of the Common Schools.

On June 17, 1996, the Land Board approved the State Forest Land Management Plan (SFLMP). The SFLMP provides the philosophy adopted by DNRC through programmatic review (DNRC, 1996). The DNRC will manage the lands in this project according to this philosophy, which states:

Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biological diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream... In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives.

On March 13, 2003, the DNRC adopted Administrative Rules for Forest Management (Rules) (Administrative Rules of Montana [ARM] 36.11.401 through 450, DNRC 2003). The Rules provide DNRC personnel with consistent policy, direction, and guidance for the management of forested trust lands. Together, the SFLMP and Rules define the programmatic framework for this project.

Stands within the project area are dominated by Douglas-fir with an intermittent scattering of Lodgepole pine and Ponderosa pine. Most of the advanced regeneration is suppressed and of poor form and vigor.

The predominant fire regime is believed to have been low to moderate intensity ground fires with patches of stand replacement fires. Most of these stands would be a mixture of fire groups 4 and 5 indicating a fire frequency between 5 and 45 years (Fischer and Bradley 1987). The majority of the overstory trees in the proposed project area are between 85 – 125 years old with few scattered older trees, usually in clumps. Fire suppression has increased fuel loading, ladder fuels and promoted forest encroachment into historic grasslands. Tree mortality and in-growth are contributing to the possibility of a fire event which may be of greater intensity and extent than would be expected to have occurred historically. This type of fire event could lead to elimination of important historic characteristics of the site (relic Ponderosa pine and Douglas-fir), loss of economic timber values, and other adverse effects such as water quality issues and loss of soil productivity, through erosion. The heavy tree stocking levels are causing stress, mortality and increasing the incidence of western pine beetle, mountain pine beetle, Douglas fir bark beetle, and western spruce budworm attacks.

The proposed harvesting would thin overstocked stands, reduce susceptibility to insect and disease, increase radial growth rates of the retention trees, return revenue to the school trust, potentially lower wildfire intensities (should one occur), allow for enhanced regeneration of Ponderosa pine, where possible and move stands to a desired future condition which more closely resembles historic conditions.

1.3 Proposal Objectives

In order to meet the goals of the management philosophy adopted through programmatic review of the State Forest Land Management Plan, the Department has set the following specific project objectives:

a. Harvest 5.0 to 8.0 MMBF of timber to provide continuing income for the Montana School Equalization Account in a manner consistent with sustained-yield management principles.

In 1995, The Montana Legislature passed House Bill 201, which established a DNRC sustained yield annual timber harvest mandate. This law was codified as 77-5-221 through 223. The proposed project would generate an estimated \$1,200,000 income and assist in meeting the mandate.

b. Promote long-term production of timber for generating revenue to the Montana School Equalization Account.

The proposed silvicultural treatments are a mix of even and uneven-aged management type harvests which include group selection, individual tree selection, shelterwood, commercial thinning and small patch (< 5 acre) clear-cut prescriptions designed to emulate a mixed severity fire event and maintain diverse mosaic patches which were believed to have occurred historically. Emphasis would be placed on retaining healthy vigorous trees while maintaining structural and species diversity, encouraging ponderosa pine restoration and regeneration, regenerating seral species such as aspen,

willow, shrub and herbaceous species. The proposed treatment would move stands towards a desired future condition which is expected to have occurred historically.

c. Maintain the DNRC ownership in an ecological condition which is sustainable and provides for a wide variety of resources to generate future income.

A consistent DNRC Forest Management philosophy is that a diverse forest is a healthy forest. Improvement of existing roads to reduce sediment delivery to streams, retention of coarse woody debris for nutrient cycling, and improving stand condition health would increase growth rates and help to maintain and improve resource conditions in the area. Retaining trees in a wide range of diameter classes would provide structural and species diversity as well as move the age class distribution toward levels which more closely resembled historical conditions. Ponderosa pine restoration and regeneration would be encouraged, where possible, and overall radial growth rates would be improved. Increased levels of aspen, willow, shrubs and herbaceous species could occur after harvesting, enhancing species diversity.

d. Return the stands to stocking levels and fuel loads closer to historical levels and creating healthier stands.

Due to lack of management and elimination of natural fire, stocking levels of Douglas-fir have greatly increased causing stress, mortality and decline in forest health. The proposed harvest would promote vigor by leaving a healthier stand with much improved average radial growth rates, which in turn, will make stands less susceptible to mortality from insect and disease.

1.4 Scope of This Environmental Analysis

1.4.1 History of the Planning and scoping process

Scoping notices were sent in March 2004 and comments from the general public and specialists (from inside and outside DNRC) were solicited as part of this EA (Mailing list located in project file). A legal notice was placed in the weekly Philipsburg Mail.

1.4.2 Cooperating Agencies with Jurisdiction and Required Permits

Other local, state, or federal agencies that have jurisdiction or review responsibility are listed below:

-MT Dept. of Fish, Wildlife and Parks	124 permit (Stream Preservation act)
-MT Dept.of Natural Resources and Conservation	SMZ Law Compliance
-MT Dept.of Environmental Quality	Open Burn. Regs., 3A Permit

1.4.3 Identified Issues

Issues were identified from concerns and comments expressed by individuals and special interest groups, along with internal and external agency specialists. External comments were received from the Department of Fish, Wildlife and Parks, Confederated Salish and Kootenai Tribes, Dalton Morse (adjacent landowner) and Dwight Crawford (Forester, Sun Mountain Lumber).

The comments received were developed into issues and concerns that are analyzed in this assessment. These are not listed in order of importance.

1. The proposed action might cause impacts to Threatened, Endangered and Sensitive Species.

The Montana Natural Heritage Program was contacted for information regarding species occurrence in the vicinity of the project area. Data indicated the presence of Westslope Cutthroat Trout in Hoover Creek and Lynx within the project area. There were no recorded incidences of sensitive plant species. Their report is located in the project file. A wildlife analysis was conducted by DNRC Wildlife Biologist, Mike McGrath. A water quality and fisheries analysis was performed by DNRC Hydrologist, Renee Myers. This issue will be addressed further in Chapters 3 and 4. The following species of concern were analyzed but eliminated from further study:

Peregrine Falcon

There is concern that timber harvest activities would disturb nesting peregrine falcons. The nearest known peregrine falcon nest is located approximately 31 miles south of the project area. Thus, the proposed action would have minimal risk of direct, indirect, or cumulative effects to this species.

Fisher

There is concern that timber harvest activities would negatively affect fisher. The project area does not currently contain forest types preferred by fisher (e.g., western larch/Douglas-fir, mixed conifer, Engelmann spruce, etc.), and is spatially separated by 3 miles of recent timber harvest from potential habitat to the east. Because of the surrounding forest fragmentation, there would likely be low risk of direct, indirect, or cumulative effects to fisher as a result of the proposed action.

Black-backed Woodpecker

There is concern that timber harvest activities would disturb black-backed woodpeckers. This species is most often associated with areas that recently experienced stand-replacing fire (Hutto 1995). The 2003 fire season produced approximately 1,650 acres of burned habitat (Moose Wasson Fire) within a 13-mile radius of the proposed project area that may be suitable for black-backed woodpeckers. Thus, with the proximity of potentially suitable habitat, the proposed action would likely have low risk of direct, indirect, or cumulative effects to this species.

Townsend's Big-eared Bat

Townsend's big-eared bats occur in a wide variety of habitats, yet its distribution tends to be strongly correlated with the availability of caves and old mines for roosting habitat. Population concentrations occur in areas with substantial surface exposures of cavity forming rock, and in old mining districts (Pierson et al. 1999). This species is primarily a cave dwelling species that also roosts in old mine workings. It is a relatively non-migratory bat, for which no long-distance migrations have been reported. The Townsend's big-eared bat does not generally associate with other species in its roosts, particularly at maternity and hibernating sites. The generally accepted mitigations for this species (e.g., Pierson et al. 1999) recommend a 500 ft radius buffer around mine and cave entrances to minimize disturbance around roost sites. Much of the mining activity in the project area, and adjoining sections is for phosphate and diatomite, which are generally above ground operations. With the exception of a

phosphate mine in the Bert Creek parcel, all other mining operations are >1,900 feet from the project area. As a result, there would be low risk of direct, indirect, or cumulative effects to this species as a result of the proposed action.

Common Loon

The common loon is a fish-eating bird that breeds and nests on lakes and ponds. The nearest known observation for common loons is approximately 17 miles northeast of the project area on Brown's Lake (Montana Natural Heritage Database). Thus, this area is not connected through the stream network with the proposed project area. Therefore, low risk of direct, indirect, or cumulative effects would be expected to common loons as a result of the proposed project and this species will not be analyzed further in this document.

Northern Bog Lemming

There is concern that timber harvest activities could affect this species. The sphagnum meadows, bogs or fens with thick moss mats required by this species are not present within the harvest area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Columbian Sharp-tailed Grouse

There is concern that timber harvest activities could affect this species. The nearest known population of Columbian Sharp-tailed grouse occurs near Ovando, MT. However, the nearest known leks are located near the Aunt Mollie Wildlife Area, near Helmville. Because of the distance involved, the proposed action would likely have low risk of direct, indirect, or cumulative effects to this species.

Coeur d'Alene Salamander

There is concern that timber harvest activities could affect this species. This species requires waterfall spray zones, talus, or cascading streams. There are no known areas of talus, waterfalls, or splash zones within the affected area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Mountain Plover

There is concern that timber harvest activities could affect this species. The short-grass prairie habitats, or heavily grazed taller grass prairie habitats, required by this species are not present within the harvest area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Harlequin Duck

Harlequin ducks require white-water streams with boulder and cobble substrates, as well as dense riparian vegetation. Such conditions do not exist within, or downstream of the analysis area. Thus, there would be low risk of direct, indirect, or cumulative effects to this species.

2. The proposed action may cause stream sedimentation, which could adversely affect water quality.

The proposed timber sale includes five different parcels of state ownership, northeast of Drummond, that are located in the Hoover Creek, Gough Creek and Bert Creek watersheds of the Clark Fork River Basin. Most roads accessing the proposed harvest areas are located in these

same watersheds with the access road to the Bert Creek Section partially draining to Morris Creek (a tributary to the Clark Fork River). A description of each State parcel and watershed effects will be addressed in Chapters 3 and 4.

3. The proposed action may adversely affect bull trout and Westslope Cutthroat.

The proposed harvest area lies within watersheds supporting Westslope Cutthroat. It is unknown if Bull Trout are present, however for analysis purposes, it is assumed they may be present. This issue will be addressed further in Chapters 3 and 4.

4. Timber harvest might affect the recruitment or protection of old growth.

Stand Level Inventory identified 3 stands totaling 54 acres that potentially met the department's Old Growth definition (Green et al., 1992). Field data surveys showed the stands did not have sufficient old, live trees to meet the department's criteria. Post harvest stands would more closely resemble pre-fire suppression conditions which includes maintenance of large trees, snags and coarse woody debris often associated with old growth. No further analysis of this issue is planned.

5. Timber harvesting might adversely impact winter big game populations.

The Bert Creek parcel and Gough Creek parcel have been identified as important parcels for the winter range and thermal cover they provide. This issue will be addressed further in Chapters 3 and 4.

6. Cumulative effects of the proposed action.

Cumulative impacts may occur with successful implementation of the proposed project. Cumulative effects are addressed for resources carried forth to Chapters 3 and 4.

7. The proposed actions may cause soil impacts and affect soil productivity, such as: mass movement in unstable soils, increased soil erosion rates, and increase soil compaction or disturbance.

The primary risks to long-term soil productivity are erosion, displacement and compaction of surface soils. During timber harvest, equipment operation on wet sites and sensitive soils can result in soil compaction, rutting, displacement and erosion. Potential effects are a reduction in long-term soil productivity, and regeneration potential as well as impacts to coarse woody debris distribution and nutrient cycling.

Cumulative effects could occur from repeated entries into a harvest area. Under the action alternative, the risk of direct and indirect impacts is expected to be minimal with implementation of recommended mitigation measures. Many units located within the proposed project area are ground-based operations. In order to limit cumulative impacts, existing skid trails would be used, where available, if they are properly located and adequately spaced. Utilizing existing skid trails and mitigating direct and indirect effects with soil moisture restrictions, season of use and method of harvest, the risk of unacceptable long-term impacts to soil productivity would be low.

Season of operation would be winter, summer or fall. The skid trails and landings are expected to encompass approximately 15% of the total area, with a maximum of 20%. Winter harvest operations would be restricted to frozen or snow covered conditions with a minimum snow pack of 12-18 inches

loose or 8 inches packed. Harvest operations during summer and fall conditions would be restricted to periods when soil moisture at 4 inches depth is 20% or less.

Skidding would be restricted to slopes of 45% or less to reduce potential erosion and displacement. Soil moisture content on sensitive soils would be checked and approved by the Forest Officer before the start of harvest operations.

With implementation of recommended mitigation measures, direct and indirect impacts are expected to be minimal. This issue will not be addressed further.

8. The proposed harvested areas may not regenerate, increasing the cost of the project and reducing net return to the School trust.

The proposed treatments are a diverse mix of even and uneven-aged management type harvest which include group selection, light to moderate shelterwood, individual tree selection, commercial thinning, and small patch clear cuts. Small openings (approximately 2 acres), except where Lodgepole pine occur, would be created in strategic areas throughout to provide diversity and increase the likelihood of regeneration. These treatments are designed to emulate a mix of low and moderate severity fire regime which was believed to have occurred historically. Light understory burns may be utilized where possible to create a seed bed and decrease competition for ponderosa pine regeneration. Based on Adjacent harvested areas, where the harvest has been more intense and regeneration is typically abundant, natural regeneration is expected. Inter-planting may be utilized to encourage and restore Ponderosa pine where possible. In planted stands, a survival survey would be completed the first fall after planting to identify the need for follow up treatments. DNRC would complete regeneration surveys in naturally (not planted) regenerated stands. No further analysis of this issue is planned.

9. Concern about noxious weed introduction on private and state land.

Spotted Knapweed, Houndstongue, Leafy Spurge, and Toadflax are currently found within the project area. Potential weed introduction or spread in the project area would be mitigated through an Integrated Weed Management approach, including prevention, revegetation, and control. Contract specifications would require power washing and inspection of road building and harvesting equipment prior to moving the equipment onsite. Spot applications of herbicides for weed control in the project area would be conducted as needed. No further analysis of this issue is planned.

10. Timber harvest may have adverse impacts on other uses such as recreation, grazing, hunting, mineral exploration and future development opportunities.

Current uses of the sale area include grazing leases on all 5 parcels. The proposed timber harvest would not have any long-term negative affect on the grazing leases or on any current or future mineral exploration. The proposed timber harvest would also ensure that potential future timber harvests could be available by maintaining sufficient overstory trees for regeneration purposes and protection of desirable regeneration during harvesting operations. Future recreational opportunities are unknown as all sections are currently surrounded by private land. Currently all sections can be accessed for

hunting through the Dutton/Hollenbeck Block Management Area. No further analysis of this issue is planned.

11. Concern that roads may not be adequately maintained after the sale to ensure adverse impacts would not occur.

As described in DNRC rules, permanent roads located on State lands in the project area would be scheduled for maintenance commensurate with expected road use and appropriate resource protection. Maintenance on both open and closed roads would be monitored by direct inspections of road and drainage structures every five years. Maintenance operations would be scheduled based on the results of these inspections (DNRC, 2003). Maintenance of these roads would comply with BMP's. No further analysis of this issue is planned.

12. Concern about threats to cultural resources.

The Confederated Salish and Kootenai Tribal Historic Preservation Office and DNRC Archaeologist Patrick Rennie were contacted. No known Cultural sites occur in the project area. If any areas are found during project activities, a DNRC Archaeologist would be contacted and modifications made if necessary. No further analysis of this issue is planned.

1.5 Decisions to be Made From this Environmental Assessment

The following decisions are to be made as a result of this Environmental Assessment:

1. Does the proposed alternative presented meet the stated project objectives.
2. Which alternative should be selected?
3. Does the selected alternative have significant impacts on the environment?
4. Is there need for further analysis (preparation of an EIS)?

2.0 Alternatives Including the Proposed Action

2.1 Introduction

This chapter describes Alternative A: No-action and Alternative B: Action. Then based on the descriptions of the relevant resources in Chapter 3: Affected Environment and the predicted effects of all alternatives in Chapter 4: Environmental Consequences, this chapter presents the predicted effects of all alternatives on the quality of the human environment in comparative form, together with a comparison of how well alternatives meet project objectives while providing a clear basis for choice among the options for the decision maker and the public.

This chapter has four sections:

- ◆ Alternative design, evaluation and selection criteria
- ◆ Alternatives considered but eliminated from detailed study
- ◆ Detailed descriptions of the Alternatives and proposed mitigations
- ◆ Summary of the comparison of the Effects of all the alternatives

2.2 Alternative Design, Evaluation, and Selection Criteria.

As described in Chapter 1, the SFLMP and Rules define the framework for forest management on School Trust Lands. They also guided the planning and development of the proposed action. The

SFLMP philosophy and appropriate Rules have been incorporated into the design of the action alternative.

An Interdisciplinary (ID) Team was formed and initial public scoping occurred in 2004. The initial proposal was further developed within the framework of the SFLMP and its administrative rules. Data was collected for resources within the project area to analyze wildlife habitat, water quality, fisheries, desired future conditions, and project design. Potential impacts to resources were addressed through the development of specific mitigations to be incorporated into the Action Alternative.

2.3 Alternatives Considered but Eliminated from Detailed Study

There appear to be no alternatives that are likely to offer an equivalent opportunity, to generate revenue, for the following reasons: 1.) Harvesting timber in parts of the described sections would generate substantial revenue for the school trust; 2.) This action would ensure that the long-term potential for harvesting timber from these sites would be enhanced by maintaining or improving current timber growth rates and improving the forage potential for grazing use; 3.) The parcels are surrounded by private land with no legal access for the general public, except for hunting through the Block Management Program which is subject to change at any time, and there is little potential for change in the State's ability to produce revenue from recreational activities, or other approved trust land use at this time. 4.) Revisions were made to the initial proposal to mitigate unresolved conflicts, which would have required additional alternatives or created greater impacts.

2.4 ALTERNATIVE DESCRIPTION

2.4.1 Alternative A: No Action

This alternative would not implement any of the timber management activities proposed in this document. It would not exclude future timber harvesting activities.

Alternative A, the no action alternative, would retain all current tree cover. Continued tree growth, with declining individual tree radial growth and vigor would be expected. Seral species such as Ponderosa pine and aspen would continue to be reduced as Douglas-fir canopy cover increased. An increasing chance of a stand replacing wildfire, with subsequent loss of revenue to the school trust and additional environmental impacts could also occur as ladder fuel loads increase. An increase in susceptibility to insect and disease outbreaks would also be expected.

No new roads would be built and existing substandard roads and drainage features would not receive remedial measures to decrease sediment delivery to watercourses.

Existing management activities (grazing leases) would continue. Timber harvest revenues to the school trust associated with the no-action alternative would not be realized at this time.

2.4.2 Alternative B: Proposed Action

Alternative B, the action alternative, would selectively harvest approximately 6.25 MMBF from approximately 1,300 acres. Access to these sections is through 32.45 miles of entirely private easements. Approximately 10.81 miles of new road construction would be required to

access the proposed treatment areas. New roads would be closed or partially obliterated upon completion of project activities, to prevent unwanted use.

Harvesting would typically target the smaller diameter intermediate and co-dominant trees with some larger, less healthy trees also designated for cutting. Historically, the sites likely contained a higher proportion of Ponderosa pine than they do currently and, due to absence of fire, Douglas-fir makes up an un-naturally high proportion of the stand. Existing Ponderosa pine are typically in poor shape and are being out-competed by Douglas-fir. Retention of most large diameter pine and few large diameter fir would provide variable stand structure, snag recruitment and move the sites closer to historic conditions. Maintenance, restoration and regeneration of Ponderosa pine, where it occurs, would be a goal of this alternative.

The action alternative would include maintenance of access roads on private and State lands, which would reduce sediment delivery to streams in the project area. The following is a description of the proposal by individual sections.

Bert Creek

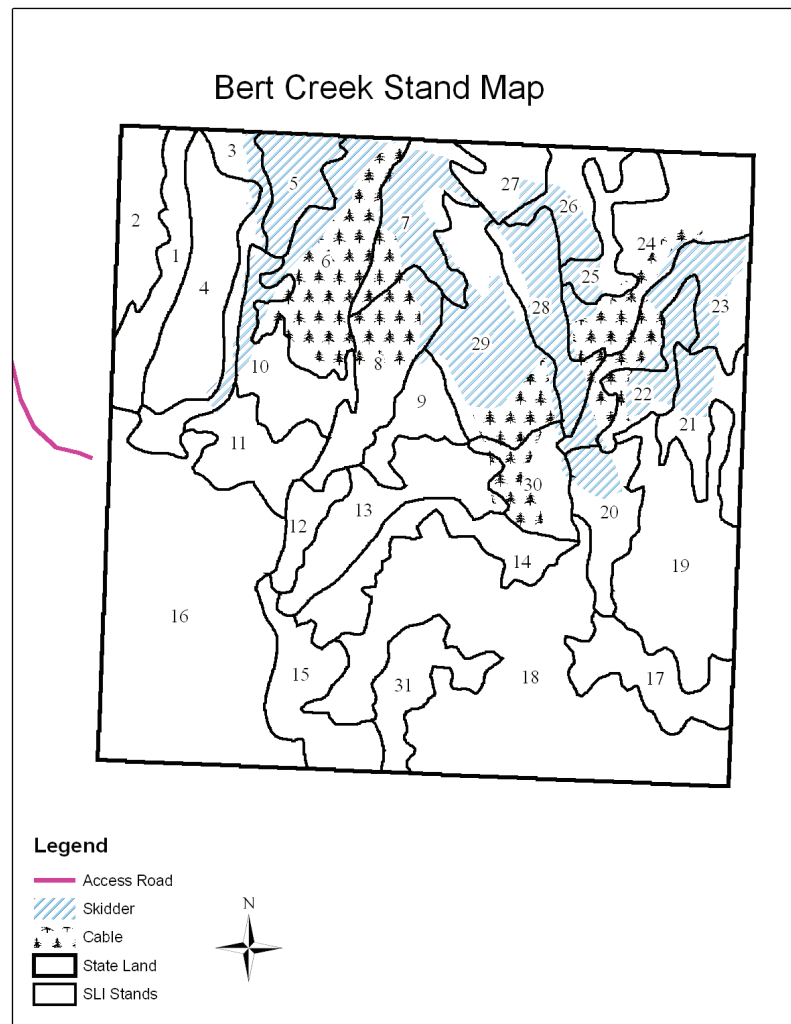
Stand level inventory estimates the section has 406 acres of forested ground with 2.892 MMBF. 234 acres are currently classified as non-forested. The proposal would target harvesting approximately 750 MBF from 160 acres through a mixture of group selection, shelterwood and seed tree type harvests. Access to the section is through 2.7 miles of existing road, which would receive improvements where needed. 2.1 miles of new road would be needed to facilitate the harvest proposal (see attachment A-1, Bert Creek Proposal Map). New roads would be closed or partially obliterated to prevent unwanted use upon completion of harvest activities.

Average basal areas currently range from 40 to 180 square feet in the areas targeted for harvest and would generally be reduced to an average of 40 square feet with ranges of 0-80. The average diameter of cut trees is anticipated to be about 12" D.B.H. Timber harvest would focus on leaving healthy looking, vigorous trees with potential to increase future growth and produce good genetic seed. The proposal would seek to regenerate stands and move them towards more historical conditions and provide diversity by retaining larger trees with inherent wildlife values (i.e. nest trees, rot, future snag recruitment, etc). Table 2.1, with map, represents existing stand conditions (DNRC Stand Level Inventory estimate) and proposed treatment and estimated basal area (BA) reductions.

Table 2.1 Bert Creek Stands

Stand	Acres	Species	BA Sq. ft.	DBH	Age	MBF/Ac	Stand MBF	Harvest Y/N (partial)	Post Harvest BA	Est. % BA reduction
1	13.7	D	100	12	140	5	69	N	100	0
2	13.1	D	50	16	130	4	52	N	50	0
3	13.9	D	90	13	130	5	70	Y (p)	20	78%
4	22.9	D	100	13	140	7	160	Y (p)	20	80%
5	10.4	D	120	14	140	10	104	Y	40	66%
6	27.3	D	130	17	140	12	328	Y	20	85%
7	17.5	D	110	14	130	9	158	Y	40	64%
8	18.1	D	90	15	130	5	91	Y (p)	20	78%

9	9.6	NF	0	0	0	0	0	N	0	0
10	15.9	NF	0	0	0	0	0	N	0	0
11	13.9	D	60	12	120	3	42	Y	20	66%
12	5.4	D	60	9	100	1	5	N	60	0
13	20.1	D	40	11	140	2	40	N	40	0
14	17.9	D	140	12	90	9	161	N	140	0
15	16.9	D	40	14	130	2	34	N	40	0
16	86.1	NF	0	0	0	0	0	N	0	0
17	15.1	D	40	12	90	3	45	N	40	0
18	85.7	NF	0	0	0	0	0	N	0	0
19	36.5	NF	0	0	0	0	0	N	0	0
20	13.1	D	110	13	110	7	92	N	110	0
21	13.9	D	100	16	140	6	83	Y (p)	60	40%
22	9.2	D	160	14	120	12	110	Y (p)	60	63%
23	20.3	D	150	15	120	11	223	Y	80	47%
24	25.7	D	110	14	110	7	180	Y (p)	60	46%
25	10.6	D	110	13	110	7	74	Y (p)	40	64%
26	10.7	D	50	18	120	3	32	Y (p)	20	60%
27	7.8	D	90	12	100	3	23	N	90	0
28	15.3	D	160	15	110	13	199	Y	40	75%
29	29.3	D	160	16	130	13	381	Y	40	75%
30	11	D	120	14	140	9	99	Y (p)	40	66%
31	12.2	D	50	13	70	3	37	N	50	0



Gough Creek

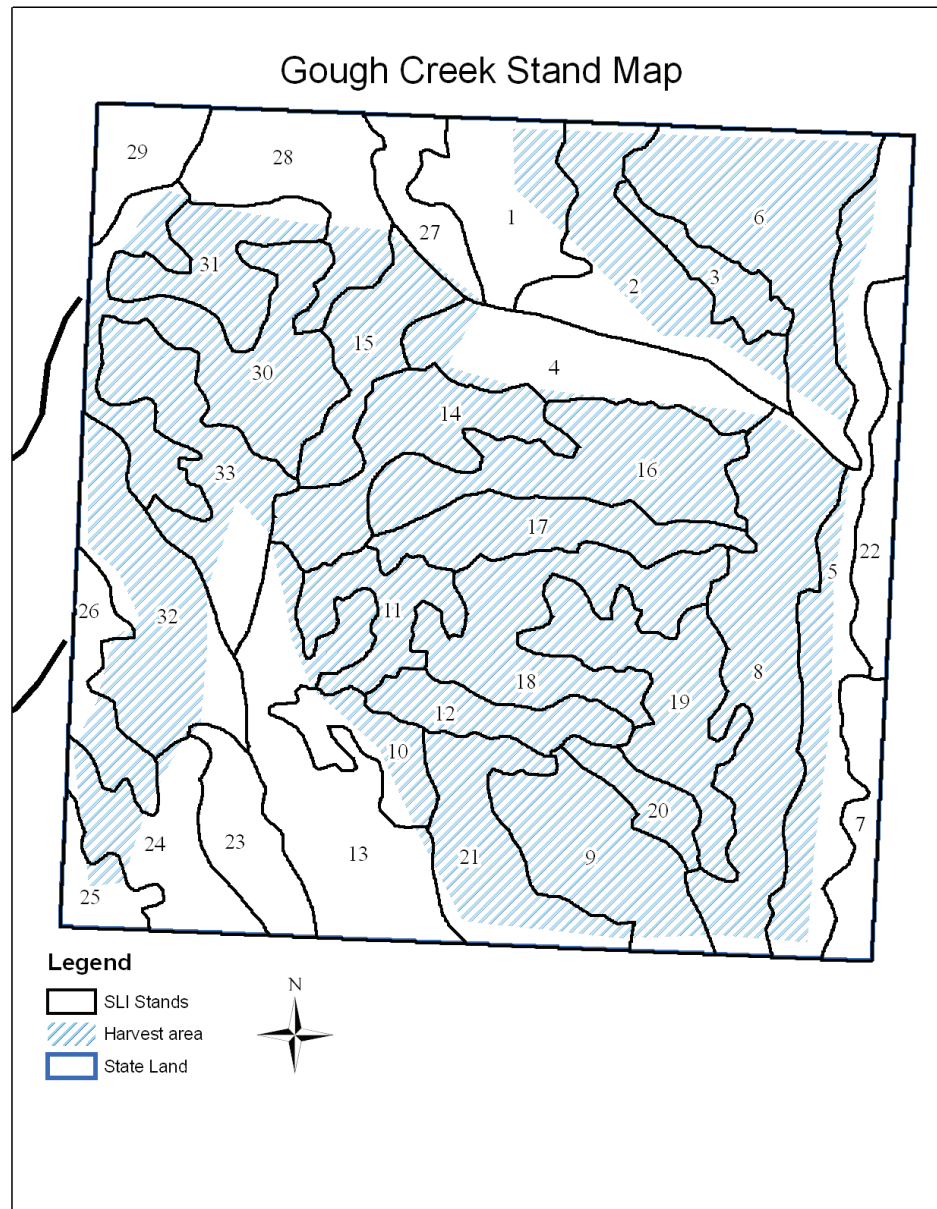
Stand level inventory estimates 4.987 MMBF on 627 forested acres within the Gough Creek parcel. Twelve acres are currently classified as non-forested. The proposal would harvest approximately 2.0 MMBF from 420 acres through a mixture of group selection and shelterwood type harvests. Access to the section is through private easements across 5.5 miles of existing road which would be improved and maintained where needed. Approximately 4 miles of new road would need to be built to facilitate the harvest (See attachment A-2, Gough Creek Proposal Map). The new road would be closed or partially obliterated upon completion of harvest activities, to prevent unwanted use.

Most stands are comprised of Douglas-fir with about 10-15% Ponderosa pine. The stands are believed to have consisted of more Ponderosa pine historically and a major goal of this proposal would be to restore Ponderosa pine and encourage regeneration, where possible. The harvest proposal would seek to enhance Ponderosa pine by removing most of the Douglas-fir, where Ponderosa pine currently exists. Post harvest basal areas would be around 20-40 square feet near Ponderosa pine and 40-80 square feet where only Douglas fir is present. Table 2.2, with map, is a representation of the existing conditions (DNRC Stand Level Inventory estimate) and proposed treatment with estimated basal area (BA) reductions.

Table 2.2 Gough Creek Stands

Stand	Acres	Species	BA Sq. ft.	DBH	Age	MBF/Ac	Stand MBF	Harvest Y/N (partial)	Post Harvest BA	Est. % BA reduction
1	20.1	D	100	12	150	6	121	N	100	0
2	26.1	D	120	12	150	8	209	Y (p)	40	66%
3	6.6	D	50	13	150	3	20	Y	20	60%
4	23.5	D	110	14	130	8	188	N	110	0
5	33.6	D	180	14	130	17	571	Y (p)	100	45%
6	35.8	D	100	13	150	7	251	Y	40	60%
7	10.7	D	70	14	130	6	64	N	70	0
8	38.5	D	140	13	130	9	347	Y	60	58%
9	22.1	D	120	13	150	7	155	Y	40	66%
10	10.3	D	90	17	150	7	72	Y (p)	40	56%
11	12.4	NF	0	0	0	0	0	N	0	0
12	9.9	D	130	14	130	9	89	Y	40	70%
13	33.9	D	110	14	120	8	271	N	110	0
14	18.9	D	110	15	130	8	151	Y	40	64%
15	12.4	D	130	13	150	9	112	Y	40	70%
16	28	D	120	15	150	11	308	Y	40	66%
17	16.8	D	120	14	150	9	151	Y	40	66%
18	26.3	D	90	13	150	5	132	Y	40	56%
19	23.1	D	110	14	150	8	185	Y	40	64%
20	6.9	P	80	16	140	6	41	Y	40	50%
21	21.5	D	80	17	150	5	108	Y	40	50%
22	12.4	D	120	15	150	10	124	N	120	0
23	13.4	D	80	12	150	4	54	N	80	0
24	15.8	D	110	14	150	9	142	N	110	0
25	8.3	D	60	15	100	3	25	N	60	0
26	9.9	D	40	13	150	3	30	Y (p)	20	50%
27	8.1	D	130	14	130	12	97	N	130	0
28	21.5	D	140	15	150	11	237	N	140	0
29	8.4	D	90	13	120	4	34	N	130	0
30	33.8	D	90	11	110	3	101	Y	40	56%
31	14.8	D	130	15	120	9	133	Y	40	70%

32	26.4	D	150	12	140	9	238	Y	40	74%
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Hoover Creek (3 sections)

Stand level inventory estimates 8.506 MMBF on 1,559 acres of forested ground within the Hoover Creek parcels. 1,481 acres are currently classified as Douglas-fir and 78 acres as Lodgepole pine. The proposal would harvest approximately 720 acres and remove approximately 3.5 MMBF. 4.83 miles of new and temporary road would be built to facilitate the harvest proposal (attachment A-3, Hoover Creek Proposal Map). These roads would be closed or partially obliterated, upon completion of harvest activities, to prevent unwanted use. Access to these 3

sections is through 24.33 miles of existing roads through private land. Spot improvements would be made on these roads to improve drainage and reduce potential for water quality issues.

The proposed harvest would be a mixture of group selection, thinnings, small patch clear-cuts (where LP occurs) and shelterwood harvests designed to emulate a moderate severity fire disturbance and create diversity across the landscape. On average, post harvest basal areas are expected to be near 40 square feet with ranges of 0-80. Tables 2.3, 2.4, and 2.5, with maps, represent existing conditions DNRC Stand Level Inventory estimates) and proposed treatment with basal area (BA) reductions for each individual Hoover Creek Section (14, 16 and 22)

Table 2.3 Hoover Creek Section 14 Stands

Stand	Acres	Species	BA Sq. ft.	Age	DBH	MBF/AC	Stand MBF	Harvest Y/N (partial)	Post Harvest BA	Est. % BA reduction
1	31.3	D	40	16	150	3	94	N	40	0
2	10.2	LP	110	9	130	5	51	N	110	0
3	10.3	D	30	15	90	3	31	N	30	0
4	13.4	D	130	14	80	10	134	Y (p)	40	70%
5	16.5	D	140	11	80	9	149	Y	40	72%
6	8.5	D	100	11	70	4	34	N	100	0
7	6.6	D	100	14	150	8	53	N	100	0
8	78.1	D	50	16	150	4	312	N	50	0
9	4	D	40	5	80	0	0	Y	20	50%
10	10.3	D	110	15	150	8	82	Y	40	64%
11	65	D	50	18	150	5	325	N	50	0
12	13.5	LP	80	11	90	4	54	Y	0	100%
13	20.2	LP	100	7	80	1	20	Y	0	100%
14	19.2	LP	120	10	90	5	96	Y (p)	0	100%
15	31.8	D	130	12	90	8	254	Y (p)	40	70%
16	14.9	LP	80	10	90	2	30	N	80	0
17	13.5	D	100	12	90	4	54	Y	40	60%
18	32.8	D	170	14	140	14	459	Y (p)	60	65%
19	19	NF	0	0	0	0	0	N	0	0
20	13.7	D	70	12	90	3	41	Y	40	43%
21	17.3	D	170	17	150	16	277	Y	60	65%
22	15.3	D	150	17	150	13	199	N	150	0
23	29.2	D	60	12	110	3	88	N	60	0
24	15	D	50	13	120	3	45	N	50	0
25	28.8	D	150	13	110	12	346	Y	50	66%
26	24.1	D	130	16	150	10	241	Y	60	54%
27	6.7	D	60	7	80	0	0	N	60	0
28	14.1	D	130	15	130	10	141	N	130	0
29	20.8	D	30	13	90	3	62	N	30	0
30	12.9	D	30	12	150	3	39	N	30	0

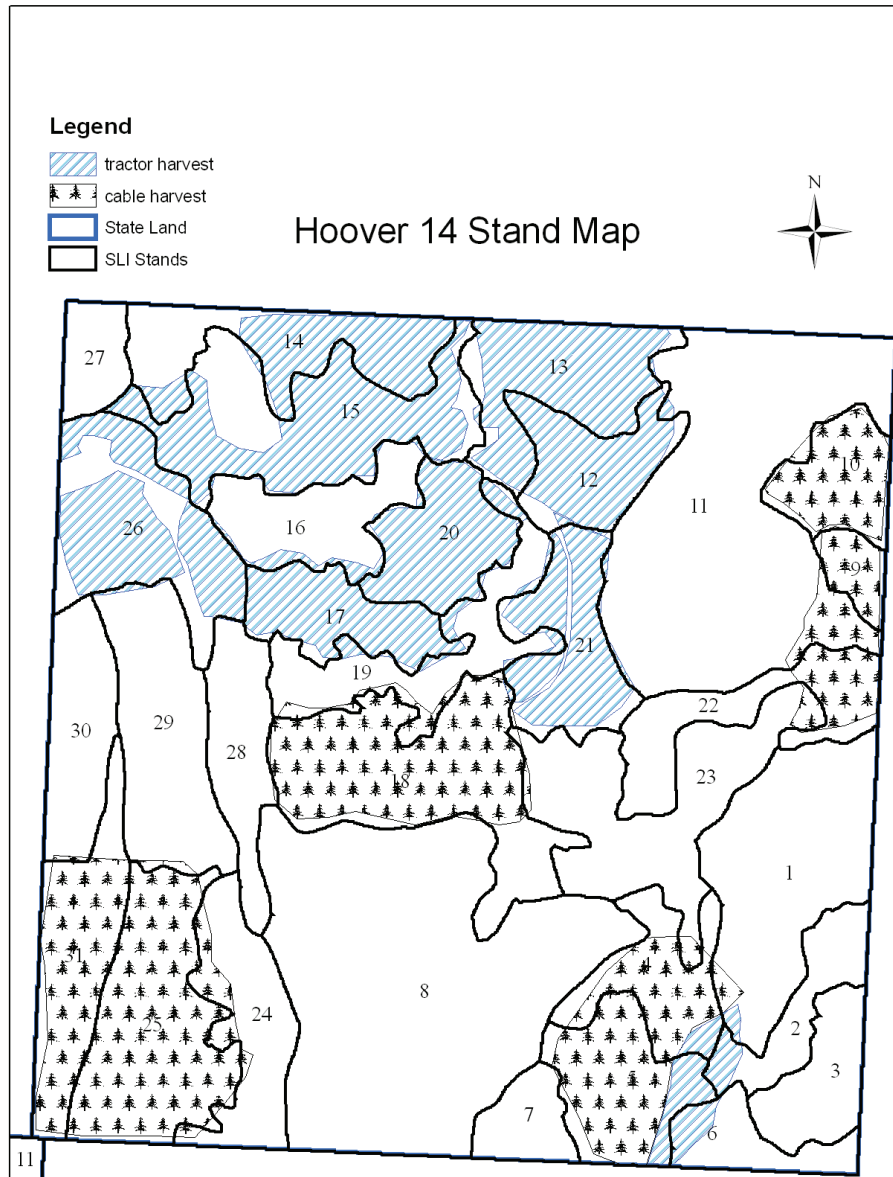


Table 2.4 Hoover Creek Section 16 Stands

Stands	Acres	Species	BA Sq. ft.	DBH	Age	MBF/AC	Stand MBF	Harvest Y/N (partial)	Post Harvest BA	Est. % BA reduction
1	4.5	D	4	5	80	0	0	N	40	0
2	62.4	D	8	7	80	0	0	Y (p)	40	50%
3	29.4	D	6	17	150	6	176	N	60	0
4	7	NF	0	0	0	0	0	N	0	0
5	8.9	D	2	19	150	3	27	N	20	0
6	11.3	NF	0	0	0	0	0	N	0	0
7	69	D	0	0	1	0	0	N	0	0
8	19.8	D	10	14	150	8	158	N	100	0
9	22.6	D	3	13	90	2	45	N	30	0
10	13.4	D	9	10	90	3	40	Y	40	56%
11	28.3	D	14	13	90	10	283	Y	40	72%
12	15.9	D	9	12	100	5	80	Y (p)	40	56%

13	12	D	5	5	80	0	0	Y	40	20%
14	12.4	D	12	12	80	7	87	Y	40	66%
15	15.4	D	5	6	80	0	0	Y (p)	40	20%
16	19.8	D	11	13	100	7	139	N	110	0
17	16.3	D	10	13	80	6	98	N	100	0
18	17.9	NF	0	0	0	0	0	N	0	0
19	11.4	D	5	18	150	6	68	N	50	0
20	40.8	D	11	10	80	3	122	Y	40	64%
21	45.2	D	8	14	80	5	226	Y	40	50%
22	4.9	D	4	18	150	4	20	N	40	0
23	34.9	D	9	13	90	6	209	Y	40	56%
24	9.9	D	11	13	80	9	89	Y	40	64%
25	16.3	D	6	7	80	0	0	N	60	0
26	13.1	D	8	13	100	5	66	Y (p)	40	50%
27	9.3	D	10	11	80	5	47	Y (p)	40	60%
28	5.3	D	8	12	80	4	21	Y (p)	40	50%
29	13.6	D	9	12	80	5	68	Y (p)	40	56%
30	6.8	D	10	12	80	6	41	N	100	0
31	16.1	D	9	12	90	4	64	N	100	0
32	14.8	D	7	13	90	5	74	N	100	0

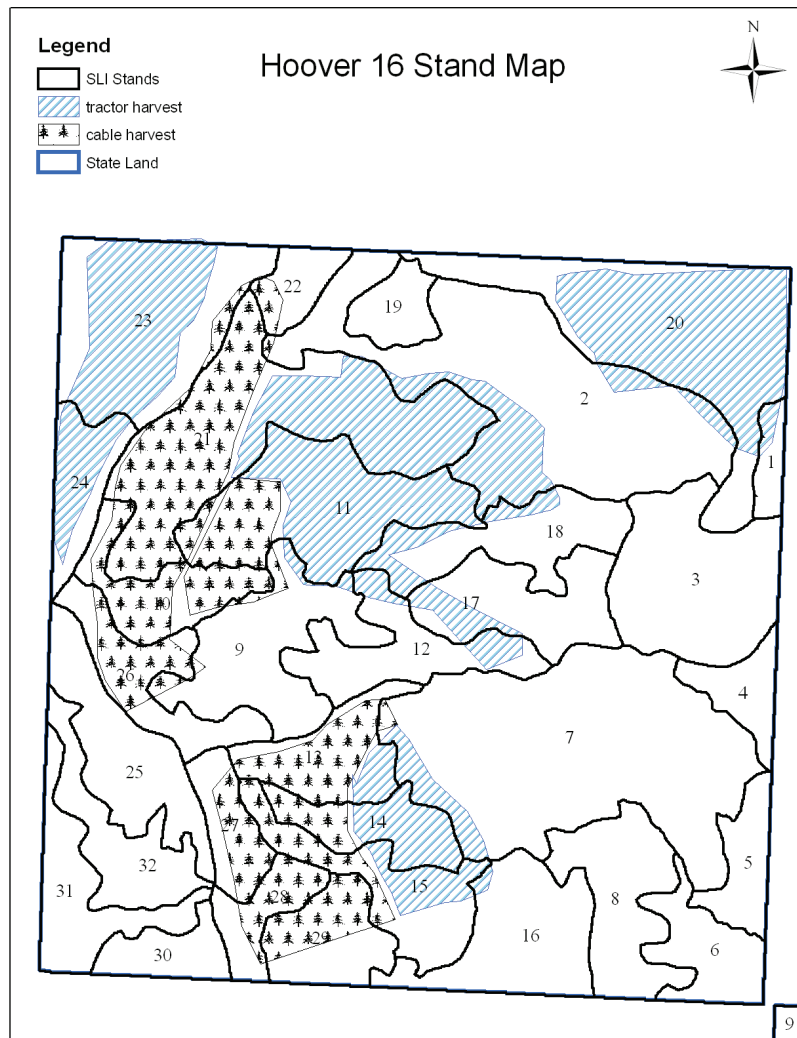
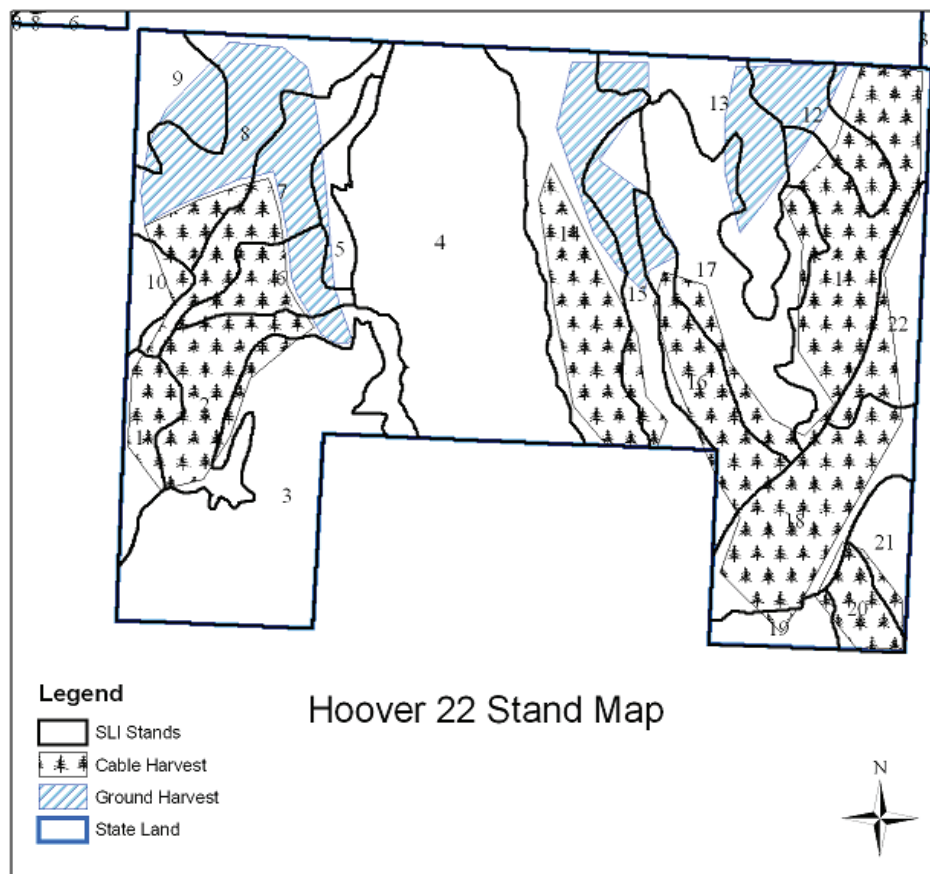


Table 2.5 Hoover Creek Section 22 Stands

Stand	Acres	Species	BA Sq. ft.	DBH	Age	MBF/AC	Stand MBF	Harvest Y/N (partial)	Post Harvest BA	Est. % BA Reduction
1	7.8	D	14	16	140	12	94	Y (p)	40	72%
2	20.1	D	11	16	130	10	201	Y	40	64%
3	43.4	NF	0	0	0	0	0	N	0	0
4	65.5	D	4	12	150	1	66	N	40	0
5	6.2	NF	0	0	0	0	0	N	0	0
6	8.6	D	12	12	130	7	60	Y	40	66%
7	14.5	D	10	13	80	6	87	Y	40	60%
8	21.7	D	10	14	130	8	174	Y	40	60%
9	9.6	D	7	17	150	5	48	Y (p)	30	58%
10	5.6	D	6	15	150	3	17	N	60	0
11	28.7	D	12	16	140	11	316	Y	40	66%
12	9.2	D	11	18	150	11	101	Y	40	64%
13	17.9	D	15	17	130	15	269	Y (p)	60	60%
14	32.9	D	11	14	100	10	329	Y	40	64%
15	13.7	D	4	18	90	3	41	Y	20	50%
16	13.5	D	15	14	140	12	162	Y	60	60%
17	29.9	D	5	17	150	3	90	N	50	0
18	23.9	D	9	10	80	3	72	Y	40	56%
19	5.3	D	4	18	150	3	16	N	40	0
20	5.2	D	11	14	120	9	47	Y	40	64%
21	7	D	5	15	100	4	28	N	50	0
22	9.8	D	12	15	150	12	118	Y (p)	40	66%



2.5 GENERAL MITIGATION MEASURES FOR THE ACTION ALTERNATIVE

The following are to be applied to the action alternative, if selected:

1. If any threatened, endangered or sensitive species were encountered during project planning or implementation. Project related activities would cease until a DNRC wildlife biologist and the project leader determine if additional habitat protection measures are needed.
2. Implement and incorporate all Best Management Practices and Streamside Management Zone guidelines.
3. Use designated skid trails and Equipment Restriction Zones to avoid damage to areas with springs, seeps, ephemeral draws and/or sensitive soils.
4. Emphasize the retention of large diameter Ponderosa pine for seed source, species diversity and potential future snag recruits.
5. All road construction and harvesting equipment would be cleaned to prevent possible introduction of noxious weeds. Equipment would be subject to inspection by the forest officer prior to moving equipment onsite.
7. Weed treatment, if necessary, may include spot herbicide treatments for identified noxious weeds. Herbicide treatment would be implemented by a certified applicator according to herbicide label directions and in accordance with applicable laws and rules of the Granite and Powell County Weed Boards and the State of Montana.
8. Snags would be retained as would green, cull trees for future snag recruitment where appropriate.
9. Newly constructed roads would be closed by gate, earth berm or slashing.
10. Promote revegetation through grass seeding newly disturbed soils on road cuts and fill slopes.
11. Site would be monitored for potential noxious weed introduction during the sale and for a two year period following the sale.
12. Tractor harvesting would not be allowed on slopes greater than 45%.
13. Skidding operations would be limited to the following conditions.
 - a. Frozen or dry conditions
 - b. 12-18" loose, or 8" compacted snow cover.
 - c. Soil moisture at 4-6" is 20% or less.
14. Riparian Harvest would adhere to DNRC rules and all applicable SMZ Laws.

2.5.1 Alternative Comparison

The alternatives are unique in terms of activities, achievement of project objectives, and effects that would occur. This section presents key characteristics of the alternatives, using tables to display differences and make comparisons. The following table (2.6) provides a brief comparison of activities that would occur if the No-Action or Action Alternative were implemented, and summarizes the predicted environmental effects. Specific details of environmental effects can be found in Chapter 3.

Table 2.6
Summary of Consequences

Items and Actions	Alternatives	
	A	B
Volume Harvested	0	6.25 MMBF
Estimated Revenue (**stumpage)	0	\$1,200,000
Harvest Acres (~)	0	1,300
% of forested ownership being treated	0	50%
Divergence from Historic Conditions	Stands denser and older than average historic conditions	Moving stands toward historic conditions in terms of age class distribution.
Tree Vigor	Declining	Improving
Effects to WYI * (A is existing conditions)	No change	Kelly Creek: 2.2% Hoover Cr: 6.2% Gough Cr: 2.0% Bert Cr: 1.9% Elk Swamp Cr: 4.0%
<i>Roads: (miles)</i>		
Reconditioning/reconst.	0	3.7
New Construction	0	10.81
Temp road	0	1.3
Maintenance	0	32.45
Effects to big game (% change in security cover)	No change	0.3% decrease
Effects to Water Quality	No change	Minimal impacts
Effects to fisheries	N	
Effects to bald eagle	No Change	Minimal risk
Effects to grizzly bear	No Change	Low to moderate risk
Effects to wolf	No Change	Minimal to low risk
Effects to lynx	No Change	Low risk
Effects to flammulated owl	No Change	Low risk
Effects to pileated woodpecker	No Change	Moderate risk
Effects to long-eared owl	No Change	Low to moderate risk
Effects to Cooper's hawk	No Change	Low to moderate risk
Effects to Northern goshawk	No Change	Low to moderate risk
Employment	No Change	60.12 man years
Labor Income	No Change	\$2,031,987.50

* WYI = Water Yield Increase

** Stumpage = The delivered log prices minus costs and an amount for profit and risk.

The revenue information in Table 2.6 is an estimate. Stumpage was estimated to sell for \$192 per MBF. This value was based on delivered log price minus costs and an amount for profit and risk. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are

not intended to be used as absolute estimates of return. The estimated volume, based on stand inventory data, was multiplied by the estimated stumpage to predict revenue values.

Costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. DNRC doesn't track project-level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by land office and statewide. These revenue-to-cost ratios are a measure of economic efficiency. The following table displays the revenue-to-cost ratio for the state and Southwestern Land Office:

Table 2.7: Revenue-to-Cost Ratios for the Southwestern Land Office and statewide.

	FY2001	FY2002	FY2003	FY2004	FY2005
SWLO	2.69	2.57	1.61	2.74	2.43
State	1.62	1.75	1.75	1.82	2.44

The following tables show a project level and Anaconda Unit wide comparison, of Douglas-fir, between historic levels (Losensky 1997), existing conditions and desired future condition.

Table 2.8
Project Level DF Age Class Distribution

Age Class	Expected Historic Levels		Alt. A No action (existing conditions)		Alt B Proposal	
	Acres	%	Acres	%	Acres	%
Non-Stocked	150	6	0	0	81	4
1-40 years	551	22	69	2	69	2
41-100 years	526	21	548	22	650	26
101-149 years	701	28	614	25	827	33
150+ years	575	23	1,272	51	876	35
Total (acres)	2,503	100%	2,503 ac	100 %	2,503 ac	100 %

Table 2.9
DF Age Class Distribution for Anaconda Unit

Age Class	Expected Historic Levels		Alt. A No action (existing conditions)		Alt B Proposal	
	Acres	%	Acres	%	Acres	%
Non-Stocked	930	6	0	0	81	.5
1-40 years	3,410	22	616	4	616	4
41-100 years	3,256	21	2,373	15	2,475	16.0

101-149 years	4,340	28	5,126	33	5,339	34.5
150+ years	3,565	23	7,386	48	6,988	45.0
Total	15,501	100%	15,501	100 %	15,501	100 %

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

Affected Environment succinctly describes the existing conditions of resources that would affect or would be affected by the proposed action. In conjunction with the description of Alternative A: No-Action Alternative in Chapter 2 and with the predicted effects of the No-Action Alternative in Chapter 4, this chapter establishes the scientific baselines against which the decision maker and the public can compare the effects of the action alternative.

** For ease of understanding the issues and impacts, chapters 3 and 4 have been combined.*

Environmental Consequences is the detailed scientific and analytic basis for the summary of comparison of effects presented in chapter 2 of this EA. This chapter presents in detail and by alternative the following effects:

- Direct, indirect, and cumulative effects of all alternatives, including the no-action alternative.
- Relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.
- Irreversible commitment of resources that would be involved if any of the alternatives were implemented.
- Irretrievable commitment of resources that would be involved if any of the alternatives were implemented.
- Adverse effects that could not be avoided.

3.2 Affected Environment and Environmental Consequences For Relevant Issues.

3.2.1 Impacts to Threatened, Endangered and Sensitive Species

Affected Environment: Bald Eagle

Bald eagles typically nest and roost in large diameter trees within 1 mile of open water.

They are sensitive to a variety of human caused disturbances, ranging from residential activities to resource use and heavy equipment operation, among others (Montana Bald Eagle Working Group 1994). Bald eagle response to such activities may range from spatial and temporal avoidance of disturbance activities to total reproductive failure and abandonment of breeding areas (MBEWG 1994). While foraging, they typically perch within 500 m of

shoreline habitat (Mersmann 1989); and roost in trees ranging in diameter from 12 to 39 inches and 49 to 200 feet in height (Stalmaster 1987). Eagles are generally associated with aquatic foraging habitat. However, roost trees are located away from houses and roads throughout their range (Buehler 2000). The nearest known bald eagle territories are located along the Clark Fork River, adjacent to Interstate 90. As a result of these territories adjacencies to the interstate highway, there would be the potential for log trucks to pass them on the way to the mill. There may also be a bald eagle territory located near Miller Lake (section 27, T 11 N, R 11 W), given the observations of adult and juvenile eagles by DNRC personnel (Brian Robbins and Mike McGrath) in 2004 and 2005. However, there currently is no known territory nearby (Kristi DuBois, MT FWP, personal communication, October 2005).

Effects of No Action Alternative

No change from current conditions would be expected under the no action alternative.

Effects of the Action Alternative

Under the proposed action, log trucks would likely pass by bald eagle nests along the Clark Fork River and Interstate 90. However, given the normal traffic flow along the Interstate, there would be minimal risk of direct, indirect, or cumulative effects to the bald eagles along the Interstate. Should a bald eagle nest be discovered near Miller Lake, and within 0.5 mile of the proposed haul roads, mitigation measures (e.g., ARM 36.11.429) would be implemented after consultation with a DNRC wildlife biologist, or alternative haul routes would be located to minimize disturbance during the breeding season.

Affected Environment: Grizzly Bear

Grizzly bears are the largest terrestrial predators in North America, feasting upon deer, rodents, fish, roots and berries, as well as a wide assortment of vegetation (Hewitt and Robbins 1996). Depending upon climate, abundance of food, and cover distribution, home ranges for male grizzly bears in northwest Montana can range from 60 - 500 mi² (Waller and Mace 1997). The search for food drives grizzly bear movement, with bears moving from low elevations in spring to higher elevations in fall, as fruits ripen throughout the year. However, in their pursuit of food, grizzly bears can be negatively impacted through open roads (Kasworm and Manley 1990). Such impacts are manifested through habitat avoidance, poaching, and vehicle collisions.

The project area is approximately 18 miles southwest of the Northern Continental Divide Ecosystem grizzly bear recovery area, but is located within occupied grizzly bear habitat (Wittinger et al. 2002). The nearby Gold Creek area has had repeated grizzly bear activity in recent years (J. Jonkel, MT FWP, personal communication, 2005). Thus, the proposed project area may be part of one or more grizzly bear home ranges. Therefore, the cumulative effects analysis area for grizzly bears encompasses approximately 348 square miles (222,427 acres), including the area between Drummond, Helmville, Avon, and Garrison, MT.

Grizzly bears are known to be more vulnerable to human interaction in areas with high open road densities or ineffective road closures. Currently there are 1.37 miles of open road per square mile (simple linear calculation; 477 miles of open road), and 1.83 total miles of road per square mile (636 miles of road), within the 348 square mile analysis area. Within the project area, there are approximately 0.05 miles of open road per square mile (project area is approximately 4.56 square miles), and approximately 2.2 miles of total road per square mile (simple linear calculation).

Effects of the no action alternative

No change from current conditions would be expected under the no action alternative.

Effects of the action alternative:

The proposed action would harvest timber on approximately 1,300 acres, and construct approximately 10.81 miles of new road, across 5 parcels northeast of Drummond. The prescriptions would largely be shelterwood harvesting in Douglas-fir, retaining approximately 40 to 60 square feet of basal area per acre, and harvesting of lodgepole pine. As such, the resulting stands would be more open, with less hiding cover among the affected parcels. Of the approximately 10.14 miles of proposed roads, all new roads would be closed to motorized vehicles. Thus, the proposed action would result in no increase in open road densities within the project area, but would effectively double the amount of total road in the project area, from approximately 10 miles to approximately 20 miles of road (4.43 miles of total road per square mile). The proposed action may also block or obliterate a road within section 14 that could potentially be accessed by a recent subdivision to the north of the affected parcel.

At the scale of the cumulative effects analysis area, there is also the Manley Limited Access Timber Salvage on one section of DNRC ground, timber harvesting on Stimson Timber Company lands, and subdivision occurring in the section immediately north of the affected Hoover Creek section 14 parcel (20 acre parcels). The proposed action would not increase open road densities within the analysis area, but it would increase total road densities from 1.83 miles of total road per square mile to 1.86 miles of total road per square mile. However, the proposed action would not affect timber or current road densities on the block of BLM lands northeast of the project area, which accounts for approximately 50% of the timbered lands within the analysis area. Due to the proximity to human development, the proposed action may make grizzly bears more vulnerable to negative interactions with humans, primarily on section 14, but the project area is largely a walk-in area, that likely sees little use because of the hiking distances involved. As a result, there would likely be low to moderate risk of direct and indirect effects, and low risk of cumulative effects to grizzly bears as a result of the proposed action.

Affected Environment: Wolf

Wolves north of Interstate 90 were recently re-classified as endangered under the Endangered Species Act. Cover, road and prey densities likely have some influence on wolves. For cumulative effects analysis, the analysis area will be the same as that of the grizzly bear. Wolf activity near the analysis area is restricted to the Halfway pack (the pack's 2004 home range is included in the cumulative effects analysis area; U. S. Fish and Wildlife Service 2004). Mule deer, white-tailed deer, elk, and moose are known to use the area (Ray Vinkey, MT FWP, personal communication, December 2005). Elk and mule deer are known to migrate through the Gough Creek and Bert Creek parcels to private land to the south. Currently, no known wolf den or rendezvous site is located within 1 mile of the project area.

Effects of the No-Action Alternative

No change from current conditions would be expected under the no action alternative.

Effects of the Action Alternative

Because cover, road and prey densities likely have some influence on wolves, the effects of the proposed action on this species would likely be similar to the effects on grizzly bears. Currently, the wolf pack that the proposed action would likely affect would be the Halfway pack, which tends to be focused around Avon. During the course of the proposed harvesting, wolves may concentrate their activity in and around the active falling operations because deer and elk tend to concentrate in active timber-falling operations to feed on tree limbs and tops. However, the more important long-term impacts would likely be associated with the increase in road densities. As discussed under the grizzly bear action alternative, the proposed action would not result in increased open road density, but would double total road densities within the project area, and in proximity to a subdivision north of section 14 in Hoover Creek. The proposed action may also block or obliterate a road within section 14 that could potentially be accessed by the recent subdivision to the north of the affected parcel.

At the scale of the analysis area: domesticated goats are grazing adjacent to the Bert Creek parcel and domesticated sheep are grazing on private lands north of Garrison for weed control; cattle are grazed on many of the private and some of the public lands throughout the analysis area; and there has been the recent DNRC Manley Limited Access Timber Salvage in section 36, T12N, R12W. The timber salvage and the proposed action would reduce the amount of cover on portions of mule deer and elk winter range, possibly affecting these species winter distributions. The greatest effects to wolves from the proposed action would likely arise from how the reduction in cover affects big game (see effects to big game). Should the proposed action negatively effect big game, wolves may switch to domesticated livestock in the late winter/early spring months, which may result in control actions to one or more wolves in the analysis area. However, the affected pack (the Halfway pack) tends to center their movements in the Avon Valley (see back log of weekly wolf reports at <http://westerngraywolf.fws.gov/>), and may not frequently venture near the

project area. As a result, there would likely be minimal to low risk of direct, indirect, and cumulative effects to wolves as a result of the proposed action.

Affected Environment: Lynx

Lynx are currently classified as threatened in Montana under the Endangered Species Act. In North America, lynx distribution and abundance is strongly correlated with snowshoe hares, their primary prey. Consequently, lynx foraging habitat follows the predominant snowshoe hare habitat, early- to mid-successional lodgepole pine, subalpine fir, and Engelmann spruce forest. For denning sites, the primary component appears to be large woody debris, in the form of either down logs or root wads (Squires and Laurion 2000, Mowat et al. 2000, Koehler 1990). These den sites may be located in regenerating stands that are >20 years post-disturbance, or in mature conifer stands (Ruediger et al. 2000, Koehler 1990).

Elevations in the project area range from 4,600 to 6,440 feet, and suitable habitat types (Pfister et al. 1977) for potential foraging occur in the area. Snowshoe hares are important lynx prey and are associated with dense young lodgepole pine stands, as well as mature stands with subalpine fir understories. Within the project area, there are approximately 55 acres of mature foraging habitat, 73 acres of Other lynx habitat, and 67 acres of temporary non-habitat. Lynx habitat within the project area is relegated to sections 14 and 16. Within the 348 sq. mile cumulative effects analysis area, 168,568 acres are in private ownership, 28,772 acres are managed by the BLM, 12,981 acres are managed by DNRC, 11,905 acres are owned by Stimson Timber Company, and 86 acres are water. Lynx likely utilize the area during the non-winter months, and winter in the western portion of the Garnet Mtns., outside of the cumulative effects analysis area (Squires et al. 2003).

Effects of the no action alternative

No change from current conditions would be expected under the no action alternative.

Effects of the action alternative

The proposed action would reduce the amount of lynx habitat available in the project area from approximately 55 acres of mature foraging habitat to approximately 22 acres, and from approximately 73 acres of Other lynx habitat to approximately 35 acres. However, temporary non-lynx habitat would likely increase from approximately 67 acres to approximately 138 acres, as a result of the proposed timber harvest. Given that previous harvest areas within the project area have yet to successfully regenerate in approximately 20 years, there may be long-term losses of approximately 71 acres of lynx habitat within the project area. (Squires et al. 2004) report that winter lynx surveys in the Garnet Mountains determined that the wintering population is centered around the Garnet ghost town, approximately 16 miles northwest of the project area. Thus, the proposed action would likely have little effect to wintering lynx populations. However, the Montana Natural Heritage Database does report historic lynx observations within the cumulative effects analysis area. While the proposed action may not affect wintering lynx, it may reduce non-winter habitat for lynx prey species (e.g., snowshoe hares and red squirrels). As a result, there

may be low risk of direct, indirect, and cumulative effects to lynx as a result of the proposed action.

Affected Environment: Flammulated Owl

The flammulated owl is a tiny forest owl that inhabits warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and is a secondary cavity nester. Nest trees in 2 Oregon studies were 22-28 inches dbh (McCallum 1994). Habitats used have open to moderate canopy closure (30 to 50%) with at least 2 canopy layers, and are often adjacent to small clearings. It subsists primarily on insects and is considered a sensitive species in Montana. Periodic underburns may contribute to increasing habitat suitability for flammulated owls because low intensity fires would reduce understory density of seedlings and saplings, while periodically stimulating shrub growth. Within the project area there are approximately 2,523 acres of flammulated owl preferred habitat types.

Effects of the No-Action Alternative

No change from current conditions would be expected under the no action alternative.

Effect of the Action Alternative

The proposed action would harvest timber, largely in a shelterwood prescription, on approximately 1,300 acres of potential flammulated owl habitat. Through opening the forest canopy, and reducing stand density levels in Douglas-fir dominated stands, the proposed action would likely create suitable nesting habitat for flammulated owls approximately 20 years post-harvest, once the stands have successfully regenerated. Thus, there would likely be low risk of direct, indirect and cumulative effects to flammulated owls as a result of the proposed action.

Affected Environment: Pileated Woodpecker

The pileated woodpecker is one of the largest woodpeckers in North America (15-19 inches in length), feeding primarily on carpenter ants (*Camponotus* spp.) and woodboring beetle larvae (Bull and Jackson 1995). The pileated woodpecker nests and roosts in larger diameter snags, typically in mature to old-growth forest stands (Bull et al. 1992) (McClelland et al. 1979). Due primarily to its large size, pileated woodpeckers require nest snags averaging 29 inches dbh, but have been known to nest in snags as small as 15 inches dbh in Montana (McClelland 1979). Pairs of pileated woodpeckers excavate 2-3 snags for potential nesting sites each year (Bull and Jackson 1995). Snags used for roosting are slightly smaller, averaging 27 inches dbh (Bull et al. 1992). Overall, McClelland (1979) found pileated woodpeckers to nest and roost primarily in western larch, ponderosa pine, and black cottonwood. The primary prey of pileated woodpeckers, carpenter ants, tend to prefer western larch logs with a large end diameter greater than 20 inches (Torgersen and Bull 1995). Thus, pileated woodpeckers generally prefer western larch and ponderosa pine snags > 15 inches dbh for nesting and roosting, and would likely feed on downed larch logs with a large end diameter greater than 20 inches.

The most abundant habitat types (Pfister et al. 1977) within the affected area are the Douglas-fir/snowberry/pinegrass phase, Douglas-fir/snowberry/bluebunch wheatgrass phase, and Douglas-fir/pinegrass/pinegrass phase (Stand Level Inventory database). Within the project area, there are approximately 426 acres that are predominately ponderosa pine or Douglas-fir/ponderosa pine, with average stand diameter ≥ 15 inches dbh that would be considered suitable pileated woodpecker habitat (SLI database). The cumulative effects analysis area will encompass the project area and a 1-mile radius surrounding the affected School Trust parcels.

Effects of the No-Action Alternative

No change from current conditions would be expected under the no action alternative.

Effects of the Action Alternative

The proposed action would harvest timber within approximately 290 acres of the project area's approximately 426 acres of pileated woodpecker habitat. In doing so, the proposed action would: (1) reduce stand canopy closure and stand density within the harvest units such that the residual stands would likely only see occasional foraging forays by pileated woodpeckers; and (2) further fragment and isolate unharvested portions of pileated woodpecker habitat into small islands ranging in size from 3 to 15 acres. The proposed action would also retain an average of at least one snag and one snag recruit, of the largest size class available, per acre. Such action may provide habitat for woodpeckers in the future. At the scale of the cumulative effects analysis area, the proposed action would further reduce the amount of available habitat for pileated woodpeckers due to prior timber harvesting on adjacent private and industrial lands. The majority of the adjacent lands within the analysis area are currently in seedling and sapling age classes, or are rangelands. Such conditions do not provide suitable habitat for this species. As a result, it is likely that the proposed action would have moderate risk of direct, indirect, or cumulative effects to pileated woodpeckers.

Other Species of Concern

Affected Environment: Long-eared owl

The long-eared owl inhabits open and sparsely forested habitats across North America, and typically lays its eggs in the abandoned stick nests of other species. It inhabits the dense vegetation adjacent to grasslands, while also nesting in open forests. The species does not seem to defend space outside of the immediate vicinity of the nest, and may nest in loose colonies. In Montana, it typically nests in dense or brushy vegetation amidst open habitats (Marks et al. 1994). The long-eared owl's winter habitat is largely similar to the breeding habitat, often using the same tree groves for wintering and breeding (Marks et al. 1994). A pair of immature long-eared owls were observed in a draw along the western edge of the Bert Creek parcel, although a quick inspection of the area did not yield a nest (M. McGrath, DNRC Wildlife Biologist, personal observation, 12 July 2005). The project area will also serve as the cumulative effects analysis area

because much of the forested areas within the project area are interspersed with open grasslands, which could serve to fulfill the species life history requirements.

Effects of the no action alternative

No change from current conditions would be expected under the no action alternative.

Effects of the action alternative

Based on review of literature on the long-eared owl (Marks et al. 1994), the species tends to nest in riparian woodlands and isolated tree groves. Additionally, there tends to be high turnover rates in nest sites annually, although the species tends to nest in loose colonies. The proposed action has potential to cause direct and indirect effects to this species through the timber harvesting. Should the harvest remove trees in or near the riparian zone, there would likely be higher risk of losing nest trees. Although only two fledglings were observed in 2005, it may be possible that one or more long-eared owl nests could be located in the Bert Creek parcel, due to the species' nature to nest in loose colonies. As a result, there may be low to moderate risk of the proposed action causing negative direct and indirect effects to one or more pairs of long-eared owls, should the nest(s) be located in a proposed harvest unit. Due to the presence of riparian zones and tree groves in the surrounding area, there would likely be low risk of cumulative effects to this species as a result of the proposed action.

Affected Environment: Cooper's Hawk

The Cooper's hawk is a forest-dwelling raptor that possesses short, rounded wings, a long tail, and is highly maneuverable in a forested environment. This medium-sized *Accipiter* hawk preys on rabbits, red squirrels, chipmunks, jays, common flickers, robins, and other song birds. Based upon its prey base, the Cooper's hawk is more of a foraging habitat generalist, however, their nesting habitat requirements tend to be more specialized (Reynolds 1988). Cooper's hawk nest stands tend to be in 30 to 70 year old, even-aged, and overstocked conifer stands (Reynolds 1988). Oftentimes, Cooper's hawks will construct multiple nests within 0.25 mile of each other, using a nest for ≥ 1 year and then utilizing an alternate nest (Siders and Kennedy 1996, Johnsgard 1990, Reynolds 1988, Kennedy 1988, Reynolds et al. 1982). Two immature Cooper's hawks were seen together in section 14 of Hoover Creek, near the northern property boundary (M. McGrath, SWLO Wildlife Biologist, personal observation, 25 August 2005). This observation likely indicates that a nest is located nearby, and may not be on the affected parcel. However, a nest was not located in the field.

Effects of the no action alternative

No change from current conditions would be expected under the no action alternative.

Effects of the action alternative

Because two immature Cooper's hawks were observed together in the northwest corner of section 14, it may be possible that a nest is located nearby. However, a brief search of the

surrounding area did not locate a nest. It is possible that the nest may be located on adjacent private lands in draws that drain into the headwaters of Chimney Creek. Until a nest is located, the proposed action is likely to affect Cooper's hawks through manipulation of foraging habitat, and resulting changes in the abundance and availability of prey species. Through implementation of the proposed shelterwood harvests, forest cover would be reduced, and habitat for many of the Cooper's hawk's prey species (e.g., red squirrel, song birds, etc.) would be reduced or removed on approximately 860 acres on the three Hoover creek parcels that could possibly be within a home range. However, habitat would still remain on the adjacent, privately owned section 15, and supplemental prey may be available at bird feeders within the subdivision in section 11. Thus, while some prey species may be more available in some locations within the home range (e.g., bird feeders, forest in section 15), they may not be as abundant on the affected parcels due to habitat loss. As a result, there would likely be moderate risk of indirect effects from the proposed action to a Cooper's hawk territory as a result of the proposed action. To minimize the risk direct effects (i.e., loss of nesting habitat) to the Cooper's hawk territory, it is recommended that should an active nest be located within the project area, a five to 10 acre zone be implemented around the nest where limited harvesting could occur, after consultation with a DNRC wildlife biologist for site specific mitigations. There would also be low to moderate risk of cumulative effects to this species as a result of the proposed action, due to subdivision in section 11, and previous timber harvests in the 1980's in section 14.

Affected Environment: Northern Goshawk

The northern goshawk (hereafter goshawk) is a forest habitat generalist with specific nesting habitat requirements (McGrath et al. 2003, Squires and Reynolds 1997, Reynolds et al. 1992). The goshawk forages on a wide range of species, with the most predominant prey being snowshoe hare, Columbian ground squirrels, red squirrels, blue and ruffed grouse, northern flickers, American robins, gray jays, and Clark's nutcrackers (Squires 2000, Clough 2000, Watson et al. 1998, Cutler et al. 1996, Boal and Mannan 1996, Reynolds et al. 1992). Thus, given the diverse array of prey species, goshawks forage from a diverse array of habitats. However, (Beier and Drennan 1997) found goshawks to forage in areas based primarily on habitat characteristics rather than prey abundance. Beier and Drennan (1997) found goshawks to forage selectively in forests with a high density of large trees, greater canopy closure, high basal area, and relatively open understories. For nest stands, goshawks will nest in pine, fir, and aspen stands on north-facing slopes that are typically in the stem exclusion or understory reinitiation stages of stand development, with higher canopy closure and basal area than available in the surrounding landscape (McGrath et al. 2003, Finn et al. 2002, Clough 2000, Squires and Reynolds 1997, Reynolds et al. 1992). Nests are typically surrounded by stem exclusion and understory reinitiation stands (with canopy closure $\geq 50\%$) within the 74 acres surrounding the nest; higher habitat heterogeneity than the surrounding landscape, and an avoidance of stands in the stand

initiation stage of stand development typify habitat in the 205 acres surrounding goshawk nests (McGrath et al. 2003). Goshawk home ranges vary in area from 1,200 to 12,000 acres depending on forest type, prey availability, and intraspecific competition (Squires and Reynolds 1997).

Within the 11,970-acre analysis area for goshawks, there has been considerable timber harvesting on small private and industrial lands in recent years. The affected private industrial lands are located immediately north and west of the Gough Creek goshawk nest. As of 2005 (the date of the most recent aerial photographs), approximately 2,440 acres have been harvested on nearby private industrial land. Two goshawk nests were located in the NE ¼ of the Gough Creek parcel. One pair of goshawks used these nests in 2005. Within the cumulative effects analysis area, there are approximately 2,274 acres of potentially suitable nesting habitat (mature forest with canopy closure >50%; delineated off of 2004 color aerial photographs) for goshawks.

Effects of the no action alternative

No change from current conditions would be expected under the no action alternative.

Effects of the action alternative

The proposed action would harvest approximately 420 acres within the Gough Creek parcel. Incorporated into the proposed harvest unit plan is an approximately 30 acre equipment restriction zone (ERZ) that surrounds two goshawk nests in the northeast quarter of the parcel. The proposed ERZ should retain the nest stand characteristics this goshawk territory is familiar with, and prevent the two nest trees from being harvested. Additionally, new road construction proposed for the Gough Creek parcel has been re-routed to minimize potential disturbance to nesting goshawks, while still allowing access for resource extraction. The proposed shelterwood harvest, with the exception of the ERZ, would: (1) reduce canopy closure and structural diversity within the affected stands in this parcel, which may subsequently affect prey abundance and availability; (2) reduce habitat diversity within a 205 acre area surrounding the nests; and (3) subsequently reduce the surrounding landscape's suitability as a nest site for goshawks. Thus, there may be low to moderate risk of direct and indirect effects to a goshawk territory as a result of the proposed action (*sensu* McGrath et al. 2003).

At the scale of the cumulative effects analysis area, recent timber harvesting on adjacent Stimson Lumber Company lands, and on private non-industrial lands to the northeast, may have forced goshawks to hunt within the Gough Creek parcel and on lands south of the affected parcel, due to lack of desirable foraging habitat characteristics (Beier and Drennan 1997), or to travel at least 0.75 mile from the nest for foraging habitat to the north and west. The proposed action may result in resident goshawks traveling farther from the nest to forage, or possibly relocation of the nest in unoccupied habitat. As a result, there would likely be moderate risk of cumulative effects to a goshawk territory as a result of the proposed action.

3.2.2 Watershed Effects

Affected Environment: Analysis Area

The analysis area includes 5 sections of State Trust Lands including sections 14, 16, 22 and 36, 11N, 11W; and section 36, 11N, 12W. Terrain in these sections ranges from gentle to steep slopes. There are 5 different watersheds located throughout these sections in the project area. These watersheds are Hoover Creek, Gough Creek, Kelly Creek, Swamp Creek and Bert Creek.

Kelly Creek

The Kelly Creek watershed is approximately 988 acres. Kelly Creek flows into Swamp Creek, just above Miller Lake. Kelly Creek is an intermittent stream channel that was observed to be in good condition on the main stem of the channel in most locations. There are reaches of channel that are disturbed as a result of historic riparian harvest. Kelly Creek is drained by one perennial tributary, ephemeral draws and dry draws with no discernable stream channel. Ownership in Kelly Creek is a combination of State Trust Lands, Stimpson Lumber and other private lands. Previous harvest has occurred in this drainage and is estimated to be approximately 507 acres.

There are two springs located in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of section 14 of T11N, R11W. These springs were observed to have significant flow in June. The springs flow into a defined channel, but go subsurface before reaching Kelly Creek. In the north half of section 22 T11N, R11W, there are wetlands located on the main unnamed tributary to Kelly Creek. These wetlands were observed to be less than .25 acres. Approximately $\frac{1}{4}$ mile upstream of the wetland area there is a reach of channel that is considered unstable. This section of channel is highly entrenched with banks containing loose soils and little vegetation.

There were two Pfankuchs taken on the mainstem of Kelly Creek to evaluate channel stability. Both sites were determined to be in good condition. There is a failed culvert on the lower portion of Kelly Creek in Section 27, T11N R11W. A portion of the fill on top of the culvert has washed away over time and water is currently running along the side of the culvert. This culvert is on Stimpson ownership and is not intended for use.

Hoover Creek

This watershed is approximately 19,280 acres. Hoover Creek is drained by two main tributaries, Swamp Creek and Kelly Creek. The condition of these tributaries are discussed individually in this report. It also drained by several gulches and intermittent channels as well as ephemeral draws and dry draws with no discernable stream channel. There is one class 1 perennial tributary in the lower half of section 14 T11N, R11W that was observed to be in good condition, with stable banks and adequate vegetation.

The main stem of Hoover Creek has been impacted by poor road location, grazing and hydromodification. There is a road that runs along the bottom of the channel for most of the drainage, with limited buffers between the road and the channel. Grazing has impacted the lower section of the channel, resulting in sloughing banks and inadequate bank woody vegetation. Large sloughing banks are occurring in the mid to lower section of the drainage in isolated areas as a result of altering flows that occurred during a breach of the dam in the early 80's in section 9, T11N, R11W. The lower dam has been breached twice. The first time the dam was breached,

major downcutting occurred, moving large loads of sediment down stream, leaving raw, eroding banks in many reaches of the channel below the dam. It breached again in 2004, resulting in altered flows increased erosion and additional downcutting.

Ownership in Hoover Creek is a combination of Stimpson Lumber, State Trust Lands and non-industrial private lands. Significant harvest has occurred in this drainage. Most of the harvest has occurred on industrial and non-industrial private lands.

Gough Creek

The Gough Creek watershed is approximately 6,574 acres. Gough Creek is a class 1 perennial stream channel that is drained by 2 perennial tributaries, ephemeral draws and dry draws with no discernable stream channel.

Gough Creek is overall in good condition. There were two phankuchs taken on the mainstem to evaluate channel stability and both sections were determined to be in good condition. There are isolated sections of the channel that have been affected by riparian grazing resulting in bank sloughing and decreased channel stability in the lower portion of the watershed. Riparian harvest has also occurred in some sections of private and State lands.

Ownership in the drainage is a mixture of Stimpson Lumber, State Trust Lands and non-industrial private land. Most of the harvest has occurred on private land and total harvested acres in the watershed is estimated at 410 acres.

Bert Creek

The Bert Creek watershed is 6,552 acres. Ownership in this drainage is a combination of State and private lands. There is one short segment of Class II stream channel on Bert Creek in the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of section 36, T11N, R12W, until it goes subsurface in the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 36, T11N, R12W. All other sections of Bert Creek are drained by ephemeral and dry draws with no discernable stream channel. There has been channel cutting in the perennial portion of Bert Creek. There is a small earthen check dam that has created an artificial wetland in the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of section 36, T11N, R12W.

There is heavy ATV use along the mainstem, which is a dry channel. This is most likely a result of leasee use for moving cattle throughout the section. This section is grazed and the lower portion of the drainage does receive heavy traffic.

Deer Creek/Elk Swamp Creek

The Elk Swamp watershed is approximately 3,705 acres. Swamp Creek flows into Miller Lake where it turns into Hoover Creek at the outlet of the Lake. Swamp Creek is drained by intermittent channels, small wetlands, ephemeral draws and dry draws with no discernable stream channel. .

Most of Swamp Creek is in poor condition. A combination of management activities has resulted in adverse impacts to Swamp Creek. Riparian harvest has occurred along Swamp Creek as well as road development and grazing. Heavy cattle use along the stream channel has resulted in bank trampling and sloughing banks. Many reaches have unstable banks and are actively

delivering sediment in many locations. Poor road location is also a problem in this drainage with the road being very close (5' at times) to the stream channel.

There has been a lot of harvest in this drainage on Stimpson Lumber, private and State Trust Lands. Approximately 664 acres has been harvested. Hydrologic recovery is occurring in most harvest units, with the re-growth of grasses and shrubs.

Analysis Methods

A watershed analysis was completed by a DNRC hydrologist for the proposed sale area to determine existing direct, indirect and cumulative effects to water quality, soils, fisheries and noxious weeds.

These areas were evaluated using a coarse filter and fine filter approach. A fine filter approach, including a water yield analysis, was conducted for this timber sale. Because of the analysis area size, existing conditions and resource value of each watershed were also evaluated.

The cumulative effects of past timber harvest activity and road construction on water yield and watershed conditions were analyzed using Equivalent Clearcut Area (ECA) methodology. This methodology estimates existing water yield increases (WYI) and predicts water yield increases of proposed harvest activities. The ECA model calculates WYI using total treated acres, percent crown cover removal, precipitation, hydrologic recovery, habitat type and road miles (Haupt, 1974). Increases in water yield and equivalent clearcut acres are based on the assumption that the entire watershed was once 100% forested. It does not take into consideration natural fire regime or portions of the watershed that may be grassland and not forested.

These numbers are an approximation. Data collected for the water yield model was taken from aerial photos, not actual harvest records. GIS was used to estimate the amount of acres harvested and the year it was harvested. Road miles were also estimated from using GIS calculations. Because there is a percentage of error in using aerial photos to estimate harvest, water yield calculations are estimates. The year of harvest is very hard to determine and could shift water yield numbers due to hydrologic recovery time. Although the best information we had was used, there is still a percentage of error.

Reconnaissance level surveys were used to observe existing conditions of soils, noxious weeds and water quality. Existing conditions of fisheries habitat was obtained through data collected by the Montana Department of Fish Wildlife and Parks, Plum Creek and observing channel habitat conditions. All existing roads in the proposed project area were evaluated by a DNRC hydrologist for past and potential impacts.

Methods used for determining Riparian Management Zones (RMZ's) followed Forest Management Rule 36.11.425 (Watershed Management), Streamside Management Rules and Riparian Management Rules.

Existing Cumulative Conditions

The existing cumulative condition is considered to be moderate. The level of existing cumulative condition is fairly consistent across most sections of the project area with their level of

existing cumulative effects. Historic and current grazing management practices have impacted the watersheds at site-specific locations. Bank trampling and absence of riparian vegetation in some areas is an indicator of these impacts, as well as an increase in width/depth ratios. Past harvest activities were also observed to have impacts with an increase in road densities over time as well as a reduction in riparian canopy in some reaches of stream. Many of the current road systems do not meet BMP standards. Lack of maintenance has resulted in non-functioning road drainage features or features that are functioning at risk.

Hoover Creek has a higher level of existing cumulative effects than the other project locations, due to hydromodification. The breach of the dam in section 9, T11N, R11W mentioned above has resulted in long-term cumulative effects to the stream channel. Channel incision and raw banks are expected to provide long-term sediment delivery to the channel.

Water Quality

Affected Environment: Kelly Creek

There are some isolated sections where the road is directly adjacent to the Creek, but these sections are minimal (approximately 300'). This portion of road is well vegetated and stable and no direct sediment delivery was observed. Signs of past riparian harvest along Kelly Creek were observed during field review. Most of the harvest in this drainage has occurred on industrial and other private lands.

Not all roads in the project area meet BMP standards. Most of the roads in the drainage are in fair to good condition and many have re-vegetated with grasses. In the upper drainage there is a section of road that contains a seep, and water is running down the road surface. However, this is an old road and most of the surface is vegetated with grasses, which seem to be filtering any sediment produced by the spring. There are several culverts in the project area that are partially blocked due to lack of road maintenance, but are on private land and not intended for use. There are a few old spur roads that run adjacent to the mainstem of Kelly Creek for short distances. These spurs are well vegetated, stable and were not observed to be affecting water quality. On the lower section of the mainstem of Kelly Creek, there is a failed culvert, which has contributed sediment to Kelly Creek. A majority of the fill on top the culvert has been washed away and the Creek is flowing around the sides of the culvert. The culvert is located on an old road that revegetated. Because of the vegetation, some of the sediment is filtered out before reaching the channel.

Effects of the no action alternative: Kelly Creek

Under the No Action Alternative, direct, indirect and cumulative effects evaluated were those associated with past management activities within the proposed project area. Direct, indirect and cumulative effects within the project were observed to be minimal. Alternative A would be the same for all sections of the project area, except for Hoover and Gough Creek, which are discussed below.

Effects of the Action Alternative: Kelly Creek

There are several seeps located throughout the bottom of the draw in the SW ¼SW ¼ section 14, T11N, R12W, which drain into Kelly Creek. These springs would be located within the SMZ and no trees would be harvested in or near these spring areas and each spring would be marked as an ERZ. There is also a spring located in the SW ¼SW ¼ section 14 that forms a channel, but does not have return flow to Kelly Creek. This spring and channel would require a 50 ft SMZ for the spring and entire length of the channel. In the N1/2 section 22, in the middle of the section, is a wetland that is larger than ¼ acre, but is outside of the harvest boundary and would not require any mitigation.

All proposed harvest units located in Kelly Creek are cable units. All SMZ Law and Rules would be implemented and proper buffer distances established. With proper buffers, the risk to water quality as a result of cable harvest activities is expected to be minimal.

On the lower end of Kelly Creek in section 27 is an old culvert that has blown out in the past and washed large amounts of fill down the stream channel. The old road bed has revegetated and stabilized over time. Because the stream channel does not stay within the confines of the culvert, fill will continue to wash over time as water runs down the outside of the culvert. There is no proposed use for this section of road and small amounts of sediment will continue to be delivered to Kelly Creek.

There are existing sections of the haul route that do not meet BMP standards. These sections would require the installation of addition drainage features and all drainage features that do not meet BMP standards would be improved to meet standards. There are sections of old road that are located directly adjacent to Kelly Creek, but will not be used under the proposed harvest actions.

Approximately .85 miles of new road would be constructed in Kelly Creek under the proposed alternative. There is no road construction near or adjacent to any live stream channels. There is one draw crossing in the new construction, which is dry. All new road would be constructed to meet BMP standards.

As a result of mitigation measures mentioned above, direct and indirect effects to water quality are expected to be minimal.

Cummulative Effects: Kelly Creek

Cable harvest activities proposed in Kelly Creek are anticipated to have minimal additional impacts to water quality. Roads that currently effect water quality would be improved by installing additional BMP's and fixing existing nonfunctional drainage features. Because there is no new road construction proposed adjacent to any channel, any additional effects to water quality as a result are expected to be minimal. Overall, anticipated cumulative effect as a result of the proposed activities is expected to be minimal with the implementation of all recommended mitigation measures.

Affected Environment: Hoover Creek

Not all roads within this drainage in the project area meet BMP standards. There are portions of road along the mainstem of Hoover Creek that run directly adjacent to the stream channel. Portions of this road are in poor condition and are directly contributing sediment to the stream channel.

The lower portion of this drainage has been impacted by poor historic and current grazing management practices. There are reaches of stream channel that contribute sediment as a result of bank trampling and loss of riparian vegetation along the banks for stability. Width depth ratios have also increased in some reaches due to bank trampling and decreased bank stability. Woody vegetation in the riparian area has also decreased from historic conditions due to intensive grazing.

The dam breach in section 9, T11N, R11W, mentioned in the analysis area section of this report has caused major sediment deposition in the reaches below the dam. Intense sheer stress and downcutting has occurred as a result of these flows and left many of the banks raw and the channel highly entrenched, causing long-term sediment delivery to the channel.

In the upper drainage, cattle grazing is less intense and the stream channel has been less impacted. There is a sufficient vegetative buffer between the road and the stream channel in most, but not all, upper sections of the drainage. Some reaches of road in this upper section do not meet BMP standards and should be improved and maintained to protect water quality.

There is a road that runs adjacent to an unnamed tributary of Hoover Creek for approximately 1 mile in sections 14 and 23 of T11N, R11W. The road in the upper portion of this tributary is in good condition and well vegetated in most areas. There are some sections of this road that are close to the channel and direct sediment delivery could occur without mitigation measures.

Hoover Creek is listed on the 1996 and 2004 TMDL list of impaired water bodies. Possible causes listed were siltation and turbidity. From the headwaters to Miller Lake, probable causes were listed as dewatering, flow alteration, nitrogen and nutrients. From Miller Lake to the confluence of the Clark Fork it was listed as others. Probable source are agriculture, grazing, highway maintenance and runoff, hydromofication, dam construction, habitat and bank modification.

Beneficial uses for Hoover Creek include, domestic, fish and wildlife, irrigation and stock.

Effects of the no action alternative: Hoover Creek

Under the No Action Alternative, direct, indirect and cumulative effects evaluated were those associated with past management activities within the proposed project area. Damage done to the stream channel as a result of both dam breeches would continue to impact the channel over time if long-term sediment delivery continues eroding raw banks caused by the tremendous increase in flows from the dam breach. Impacts caused as a result of poor grazing management would also continue until an effective grazing management strategy is established.

Hoover Creek is listed on the 1996 and 2004 list of impaired water bodies with probable causes as dewatering, flow alteration, nitrogen and nutrients. These impairments would continue under the no action alternative.

Effects of the action alternative: Hoover Creek

There are approximately 110 acres proposed for harvest that flows directly into an unnamed tributary of Hoover Creek above Miller Lake. There is a wetland located directly west of the stream channel in the SE ¼ of section 14, but is not an associated wetland and is outside of the proposed harvest units. All SMZ Laws and Rules would be implemented in this portion of the project area, but no special water quality mitigations are required for this section of stream within the proposed sale area. Because the harvest unit begins above the end of the defined channel, SMZ buffers are expected to adequately protect water quality. All other draws in the project area in Hoover Creek are dry.

Roads proposed for use in the Hoover Creek watershed vary from poor to good condition. Some sections of road are in poor condition and would require addition drainage features as well as the repair of some existing drainage features. Some culverts would need to be cleaned of debris and drain dips would need to be reshaped in isolated sections. There are portions of the Hoover Creek road that are poorly located and directly adjacent to the stream channel. These sections of road would require site specific mitigations to reduce potential sediment delivery to the stream channel.

Because Hoover Creek is listed on the 1996 and 2004 TMDL list, spot mitigations would be taken along roadways to reduce sediment delivery and help improve water quality. All SMZ Laws and Rules would be strictly implemented. The proposed harvest occurs in Kelly Creek and Elk Swamp Creek tributaries, which drain into Miller Lake, before they reach Hoover Creek. Proposed actions are not expected to exceed reasonable conservation practices and any effects to water quality would be minimal.

If mitigations mentions above are implemented, direct and indirect effects as a result of the proposed activities are expected to be minimal.

Cumulative Effects: Hoover Creek

Road work proposed for this section of the project area is expected to improve water quality with additional BMP work and sediment mitigation for those sections of road located directly adjacent to the stream channel. Impacts to water quality as a result of the Dam breeches are expected to continue. The harvest units located adjacent to an unnamed tributary to Hoover Creek are located next to a dry reach with no defined channel. SMZ buffers are expected to be adequate to minimize any additional impacts to water quality. Other activities in the drainage (agriculture, grazing, road use) are expected to continue. With the implementation of recommended mitigation measures, cumulative effects are expected to remain moderate.

Affected Environment: Gough Creek

There is a road that runs along the mainstem of Gough Creek for most of the drainage. The distance between the road and stream varies. In some areas, the road is directly adjacent to the stream while in other locations the road has a significant filtering buffer. The road is in poor condition in many locations. There are 4 undeveloped fords which are in poor condition and contributing sediment to the stream channel at each location. The road, along with the fords, are not used on a regular basis, but get frequent illegal use during hunting season. Impacts to water quality as a result of the road are isolated at the ford locations and those areas where the stream is located directly adjacent to the channel and the riparian buffer is inadequate.

Because most of the ownership in this drainage is private, most of the past harvest has occurred on private and industrial lands. Minimal previous harvest on State Trust Lands was observed. Impacts on water quality as a result of past harvest activities were observed to be minimal. Beneficial uses for Gough Creek include stock and lawn and garden.

Effects of the no action alternative: Gough Creek

The main impacts to water quality over the years, have been caused by poor road location and grazing. The four undeveloped fords on the main Gough Creek road are a constant source of sediment delivery. Under the no action alternative, this road would continue to be a sediment source until the fords are removed and the banks rehabilitated, or they are made into functional fords. Impacts as a result of grazing management practices are also expected to continue until better grazing management practices are established.

Effects of the action alternative: Gough Creek

Approximately 3.5 miles of new road would be constructed in section 36 under the proposed activities. All new road construction would be installed to meet BMP standards. There are two stream crossings and 3 draw crossings where culverts would be installed with the new road construction. The stream crossings are located on the unnamed tributary to Gough Creek in the N1/2 of the section. A 24" culvert would be installed at the first site. Just south of the stream crossing, there is a small seep that would require a relief culvert and catch basin to effectively drain the site. The inlet and outlet of both of the culverts would be rock armored with 6-12" diameter rock.

The second stream crossing is located further down on the same unnamed tributary. At this location, an 18" temporary plastic culvert or 24" permanent culvert would be installed. If temporary, the culvert should be removed immediately following harvest activities and before spring runoff. Following removal, the bed and banks would be reshaped to their natural contours and the banks would be seeded to establish vegetation as quickly as possible.

The proposed harvest activities in Gough Creek adjacent to the stream channel are ground based activities. All SMZ Laws and Rules would be applied. SMZ buffers are anticipated to be

adequate to protect water quality. Additional mitigations would include limiting harvest to slopes less than 45% and implementing proper skid trail and planning design.

Direct and indirect effects are expected to be minimal as a result of implementation of recommended mitigation measures.

Cumulative Effects: Gough Creek

As mentioned above the biggest impacts to Gough Creek are caused by poor road location and grazing management activities. Mitigations mentioned above as part of new road construction, are expected to minimize any impacts to water quality. Although a large portion of the Gough Creek section is proposed for harvest, impacts are expected to be minimal to moderate.

Affected Environment: Bert Creek

There is one segment of Class 2 stream channel located in this drainage. In this segment of channel, sediment is being delivered to the channel due to eroding and sloughing banks. Because this channel has no delivery to any other channel, any sediment delivered to this section of channel is filtered by grasses and other vegetation. All other channels in the drainage are dry.

Not all roads in this portion of the project area meet BMP standards. Some sections of road lack adequate drainage and would require additional drainage features to meet BMP standards. The section itself has very limited road access and is mostly accessed by ATV's. There are ATV trails alongside the dry channel bed on the mainstem of Bert Creek that run halfway up the drainage. These tracks also serve as cattle trails. Because this channel is dry, no impacts to water quality were observed in this reach.

Most of the ownership in this drainage is private and timber harvest has been limited. There were little or no impacts observed in this drainage as a result of past timber harvest. Beneficial uses for Bert Creek include domestic stock, and irrigation.

Effects of the no action alternative: Bert Creek

Under the No Action Alternative, direct, indirect and cumulative effects evaluated were those associated with past management activities within the proposed project area. Under the No Action Alternative, direct, indirect and cumulative effects within the project area are expected to be minimal.

Effects of the action alternative: Bert Creek

There is one small section of Class 2 stream channel that was observed to have eroding banks. However, long-term sediment issues are not a concern due to the lack of aquatic species and no surface water delivery to any other body of water.

Not all sections of road in this portion of the project area meet BMP standards and would require additional road drainage as well as reshaping some existing road drainage features. Approximately two miles of new road would be constructed in the Bert Creek drainage. The new road would cross two draws in Bert Creek, but both channels are dry at these locations and no other water is located near or adjacent to any road construction. BMP standards would be applied

to all new road construction. Direct and indirect effects to water quality as a result of the proposed practices are expected to be minimal.

Approximately 160 acres of harvest are proposed for the Bert Creek drainage. There are only two small sections of ground harvest located adjacent to the stream channel. The channel at these locations have been observed to be dry. All SMZ Laws and rules would be implemented, where applicable. Direct and indirect effects as a result of timber harvest are expected to be minimal with implementation of BMP's and the lack of water in this section.

Cumulative Impacts: Bert Creek

Cumulative impacts to water quality as a result of the proposed actions are expected to be minimal. Past historic harvest has occurred in this drainage, but the effects to water quality were observed to be minimal. The current proposed actions are not expected to increase impacts if BMP standards and the SMZ Law and Rules are implemented.

Affected Environment: Elk Swamp Creek

The road runs adjacent to Swamp Creek for a majority of the drainage. The road is in poor condition and the buffer between the road and the stream is minimal. There is currently direct sediment delivery occurring at several locations along the main road. Heavy rutting has occurred on some sections of road and in some areas, less than 5 feet from the channel. There is a culvert in section 16 of Deer Creek that is undersized and has exceeded its flow capacity, which has caused water to flow down the road, resulting in rutting and erosion of the road surface, as well as erosion at the inlet and outlet of the culvert. Many sections of road in the Elk Swamp/Deer Creek drainage do not meet BMP standards and lack adequate surface drainage. Direct sediment delivery is occurring due to filled in drain dips, plugged culverts and springs that flow across the road, using the road as its stream course.

Cattle grazing, occurring in this drainage, has caused bank sloughing and trampling in some areas, increasing sediment delivery and decreasing bank stability. Recent and historic timber harvest has occurred in the project area on Stimpson Lumber and State Trust Lands. Adequate riparian buffers have offered a sediment filter, minimizing the amount of sediment delivery that has reached the channel.

Effects of the no action alternative: Elk Swamp Creek

Under the no action alternative, the main road that runs along Elk Swamp Creek would continue to be in poor condition and act as a long-term sediment source in several locations. The buffer between the stream channel and the road is inadequate in many locations and would also continue to be a potential sediment source. An undersized culvert at the junction of Deer Creek and Elk Swamp Creek in the NW ¼SW ¼ of section 16 is expected to exceed flow capacity during high water years, allowing surface runoff to flow down the road and cause rutting as well as direct sediment delivery.

Impacts as a result of cattle grazing would also continue until a proper grazing management plan is developed. Under existing conditions, direct, indirect, and cumulative impacts to water quality as a result of poor road location and grazing is moderate.

Effects of the action alternative: Elk Swamp Creek

Under alternative B, a significant amount of road improvements would be needed to meet minimum BMP standards. Because of soil composition and current standards of road, hauling would be restricted only to dry or frozen conditions to minimize rutting of the road surface. Existing drain dips would need to be reshaped and additional dips constructed in some locations. Blading of the road would be a requirement immediately following timber harvest activities.

Approximately 2.5 miles of new road would be constructed in the Elk Swamp Creek drainage. There is one crossing that would require a 24" culvert to be installed. the installation would require armoring at the inlet and outlet and seeding of all disturbed areas. All new road construction would meet BMP standards.

The proposed harvest includes a large cable harvesting unit along Deer Creek. Cable harvesting minimizes the amount of erosion and displacement that could potentially deliver sediment to the stream channel, by minimizing ground disturbance. Implementation of SMZ buffers are expected have minimal direct and indirect effects on water quality.

Overall, direct and indirect impacts to water quality are expected to be minimal as a result of the proposed activities.

Cumulative Effects: Elk Swamp Creek

Cumulative effects of the action alternative to Elk Swamp Creek are moderate. Most of the current cumulative effects are a result of poor road location and grazing. Although grazing impacts would remain the same, implementation of recommended mitigation measures for roads are expected to help improve water quality throughout the road system. As a result cumulative impacts are expected to remain low to moderate.

Affected Environment: Water Yield

Existing Water Yields

Stream	Existing WYI%	Existing ECA Acres
Kelly Creek	2.2%	174
Hoover Creek	6.2%	2119
Gough Creek	2.0%	189
Bert Creek	1.9%	122
Elk Swamp Deer	4.0%	242

* Equivalent ECA is a function of total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest area.

* % water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction. The amount of existing ECA acres in a watershed,

determines the WYI %.

The existing water yields in all 5 watersheds in the project area are low. There were no observed impacts to perennial or intermittent channels in any watershed. Most of the existing harvests occurred in the 1980's, with limited harvest in the 90's and 2003-2004. Gough Creek and Bert Creek have had some more recent harvest on private non-industrial lands. The more recent harvest activity was accounted for through personal observation.

Cumulative Existing Impacts: Water Yield

Cumulative existing impacts to all 5 watersheds as a result of water yield increases, is low. Although moderate quantities of harvest did occur in the 1980's, hydrologic recovery has occurred and the re-growth of vegetation is providing interception and water storage. Hoover Creek is listed on the TMDL list of impaired waterbodies. The existing water yield is not at levels that would increase flows, impairing the channel and increasing sediment loads.

Effects of the No Action alternative: Water Yield

Under the No Action Alternative, direct, indirect and cumulative effects within the project area are expected to be minimal and similar to existing conditions.

Effects of the Action alternative: Water Yield

Watershed	Existing WY increases in %	Existing WY in ECA	Proposed WY increases in %	Proposed WY in ECA
Bert	1.9%	122 acres	2.2%	154
Gough	2.0%	189	3.4%	429
Kelly	2.2%	174	3.0%	220
Elk Swamp Creek	4.0%	242	5.9%	421
Hoover	6.2%	2119	6.7%	2328

The allowable water yield (WY) increases developed for all five watersheds is 15%. This number was established by determining the sensitivity of the watershed to disturbance based on existing conditions of the watershed and its sensitivity to additional impacts. Each watershed was calculated to be well below the allowable 15% increase in WY. The WY increases calculated are well below those that are considered to have any impact on the watershed and more specifically, they are not expected to impact channel form and function.

Cumulative Impacts

Because the WY increases are well below the allowable increases, impacts to the stream channel are not expected as a result of the proposed activities. As a result, cumulative impacts are expected to be minimal if all recommended harvest practice mitigation measures are implemented.

3.2.3 Fisheries Effects

The only fish bearing channels located in the project are the mainstem of Hoover Creek and Gough Creek.

Effects of the no action alternative: Hoover Creek

Under Alternative A, there would still be a risk of sediment delivery from the existing poor road location and raw, eroding banks caused by the dam breeches. Impacts to fisheries habitat as a result of poor grazing management practices would continue as well, until an effective grazing management plan is developed.

Effects of the action alternative: Hoover Creek

Under the proposed alternative, there are no units located adjacent to any section of fish bearing channel. There is one small unit on an unnamed tributary to Hoover Creek in the SE ¼ of section 14. The only fish data found was on MFISH, between river miles 0 and 11.4. It is assumed that these river miles are below Miller Lake, as the outlet of Miller Lake would be considered a migration barrier. All harvest units in the Hoover Creek drainage are above Miller Lake. The current proposed harvest is expected to have very minimal impacts on riparian vegetation associated with fisheries habitat. Because there is very little overall harvest in the drainage, flows are expected to remain the same and not anticipated to have any impacts. Because improvements to the Hoover Creek road system are expected as part of the proposed actions, water quality has the potential to improve over time with reduced sediment loads from road surface runoff. As a result, direct and indirect impacts to fisheries habitat are expected to be minimal.

Cumulative Effects: Hoover Creek

Effects to fisheries in this drainage, is considered moderate as a result of existing conditions due to grazing, hydromodification and poor road location. The proposed activities are not expected to increase these effects. Under proposed actions, sediment delivery from roads is expected to decrease. Grazing and hydromodification impacts however, would remain the same. Overall, cumulative effects are not expected to increase, but remain at moderate levels.

Effects of the no action alternative: Gough Creek

Under the No Action Alternative there would be no additional impacts on fisheries. Impacts to the stream channel as a result of grazing management would remain the same. Sediment delivery from undeveloped ford crossings would also continue to occur.

Effects of the action alternative: Gough Creek

There were no fisheries data found for Gough Creek. However, based on personal observation and discussions with locals, it is assumed that Gough Creek is a fish bearing stream channel for this report. There would be harvest along the west side of Gough Creek in section 36. All SMZ Laws and Rules and Administrative Rules would be implemented. Approximately, 60% of the canopy cover would be removed beyond the 50 ft buffer. These mitigations are anticipated to provide adequate tree retention for shade and large woody debris recruitment. The buffer is also expected to be sufficient for sediment filtration. The road located adjacent to the channel would not be used as part of the proposed actions.

With implementation of recommended mitigation measures, direct and indirect effects are expected to be minimal under the proposed activities.

Cumulative Effects: Gough Creek

With implementation of the recommended mitigation measures, mentioned above, cumulative effects in the drainage are expected to be minimal. Cumulative impacts that would occur over time are those associated with road location and sediment delivery of undeveloped fords.

3.2.4 Impacts to Big Game Populations

Affected Environment: Elk (*Cervus elaphus*)

Elk generally avoid open roads, but become more tolerant of closed roads in the area over time (Lyon 1998). Densely stocked thickets of conifer regeneration and overstocked mature stands provide thermal protection and hiding cover for elk in winter, which can reduce energy expenditures and stress associated with cold temperatures, wind, and human-caused disturbance. Additionally, extensive (e.g., ≥ 250 acres) areas of forest cover ≥ 0.5 miles from open roads serve as security for elk. Thus, removing cover that is important for wintering elk through forest management activities can increase their energy expenditures and stress in winter. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local elk herds.

Within the project area, there are approximately 0.05 miles of open road per square mile (project area encompasses approximately 4.56 square miles), and approximately 2.2 miles of total road per square mile (simple linear calculation). There are approximately 1,632 acres of forest cover that could be used for snow-intercept cover. There are approximately 673 acres of forest cover within the project area that could currently be used for security cover (Hillis et al. 1991) during the hunting season.

The cumulative effects analysis area encompasses approximately 338 square miles (216,436 acres), and corresponds to Hunting District 291. There are 52,190 acres of forest cover that could be used for snow-intercept cover, and approximately 25,418 acres (11.7% of cumulative effects analysis area) of forest cover that could be used for security cover during the hunting season. Winter range occurs on the periphery of the analysis area, with the southern winter range extending up into the Bert Creek and Gough Creek parcels of the project area (Fig. 2).

Affected Environment: Mule Deer

Densely stocked thickets of conifer regeneration and overstocked mature stands provide thermal protection and hiding cover for deer in winter, which can reduce energy expenditures and stress associated with cold temperatures, wind, and human-caused disturbance. Areas with densely stocked mature trees are also important for snow interception, which makes travel and foraging less stressful for deer during periods when snow is deep. Dense stands that are well connected provide for animal movements across wintering areas during periods with deep snow, which improves their ability to find forage and shelter under varied environmental conditions. Thus, removing cover that is important for wintering deer through forest management activities

can increase their energy expenditures and stress in winter. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local deer herds.

Within the project area, there are approximately 1,632 acres of densely canopied forest, which could provide snow-intercept, and possibly thermal cover for deer. Within the larger cumulative effects analysis area, an approximately 216,436 acre (338 square miles) area that encompasses hunting district 291, there are approximately 52,384 acres of snow intercept/thermal cover (determined using orthophotographs dated 1995 and 2004). Additionally, grazing has historically occurred on all parcels in the project area, with 390 AUMs among them. Finally, winter range occurs on the Bert Creek and Gough Creek parcels, as well as on the range south of these parcels (Fig. 1).

Effects of the No Action Alternative: Elk and Mule Deer

No change from current conditions would be expected under the no action alternative.

Effects of the Action Alternative: Elk and Mule Deer

One concern that drove alternative development was the effects of timber harvesting on elk and mule deer winter range. Elk winter range within the cumulative effects analysis area is concentrated near Avon, along the Manley ranch in the Helmville Valley, and spread out along the Clark Fork face. However, for mule deer, their winter range is concentrated along the Clark Fork face between Drummond and Garrison Junction. Thus, with previous timber harvesting done on private lands, such action within the project area could impact mule deer, and elk to a limited extent. As a result, mitigations were developed to reduce potential impacts to elk and mule deer winter range. These mitigations include:

Bert Creek

- Deferring from harvest approximately 9 acres of timber in the northeast corner of the parcel.
- To promote retention of snow intercept and hiding cover, approximately 80 to 100 square feet of basal area per acre post-harvest would be retained, rather than 40 to 60 sq. ft. per acre, on the northernmost (approximately) 15 acres in the two easternmost harvest units in the parcel. However, limited small group selection harvests would be permitted within the 15 acres.
- These mitigation measures would be employed to retain a travel corridor for mule deer and elk along Limestone Ridge that would provide snow intercept and some hiding cover.

Gough Creek

From Fish, Wildlife & Parks data, it did not appear that the Gough Creek parcel received as much winter use as Bert Creek. Mitigations in this parcel would be to provide a travel corridor for mule deer and elk, along with retention of snow intercept cover along the corridor. These measures include:

- Deferment of approximately 91 acres along Gough Creek and a tributary that runs from the northwest into the creek. Portions of this deferment function as an equipment restriction zone around a goshawk nest as well.
- Due to topography along draws that feed into Gough Creek, and in other portions of the parcel, approximately 42 acres would have heavier tree retention post-harvest.

The aforementioned mitigations on the Bert and Gough Creek parcels have been incorporated into the design of the proposed action.

With the incorporation of the mitigations, the proposed action would reduce the amount of hiding and snow intercept cover within the project area from approximately 1,625 acres to approximately 487 acres, with the largest retention in the Bert and Gough Creek parcels. Additionally, security cover (e.g., Hillis et al. 1991) within the project area would be eliminated because no remnant patches of “dense cover” would be ≥ 250 acres in size (a requirement of Hillis et al. 1991). The proposed action would reduce the various types of cover within the project area, however, it would also stimulate forage production on the affected acres. The loss in security cover would likely last approximately 40 to 60 years, until the forest successfully regenerates and has progressed into the pole and sawtimber size classes.

Within the hunting district 291, the proposed action would reduce the amount of hiding and snow intercept cover within the project area from approximately 52,190 acres to approximately 51,052 acres (a 2% decrease), and security cover would be reduced from approximately 25,418 acres (approximately 11.7% of cumulative effects analysis area) to approximately 24,745 acres (approximately 11.4% of cumulative effects analysis area). DNRC has recently harvested approximately 82 acres in the Manley Limited Access Timber Salvage, that has reduced the amount of snow intercept cover by an equivalent amount on elk winter range. Within the analysis area, approximately 60% (approximately 31,147 acres) of the snow intercept and hiding cover occurs on state and federally managed lands, while much of the same cover that has been reduced in recent years has occurred on privately managed lands that make up the majority of the analysis area. Of the 216,436 acre analysis area, approximately 124,400 acres (57%) is forested, and approximately 42% (52,190 acres) are currently providing snow intercept and hiding cover. The rest of the forested area has experienced timber harvest that resulted in loss of snow intercept and hiding cover for mule deer and elk. The proposed action would further reduce snow intercept, hiding, and security cover, but would provide for strategically placed travel corridors for elk and mule deer to use and reach winter range. Given these conditions, the proposed action may have low to moderate risk of direct, indirect, and cumulative effects to mule deer and elk.

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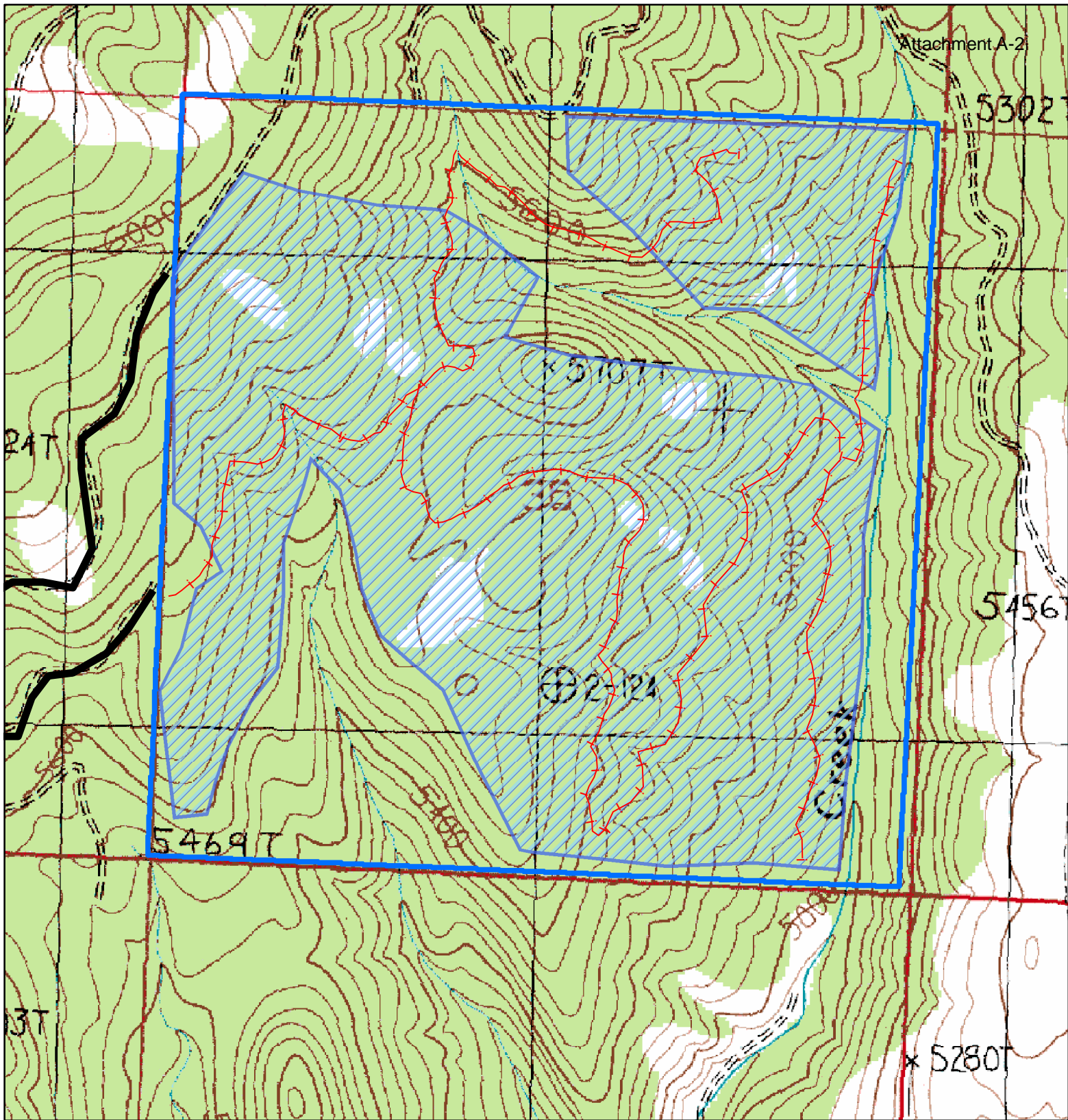
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Abbreviations and Acronyms

ARM	Administrative Rules for Montana
BMP	Best Management Practices
BA	Basal Area
DBH	Diameter at Breast Height

DNRC	Department of Natural Resources and Conservation
FWP	Montana Fish, Wildlife, and Parks
ID	Interdisciplinary
LP	Lodgepole pine
MBF	Thousand Board Feet
MCA	Montana Code Annotated
MMBF	Million Board Feet
N	North
NW	Northwest
R	Range
S	South
SE	Southeast
Rules	State Forest Land Management Rules
SMZ	Streamside Management Zone
SW	Southwest
T	Township
T, E, & SS	Threatened, Endangered, and Sensitive Species
TMDL	Total Maximum Daily Load
W	West

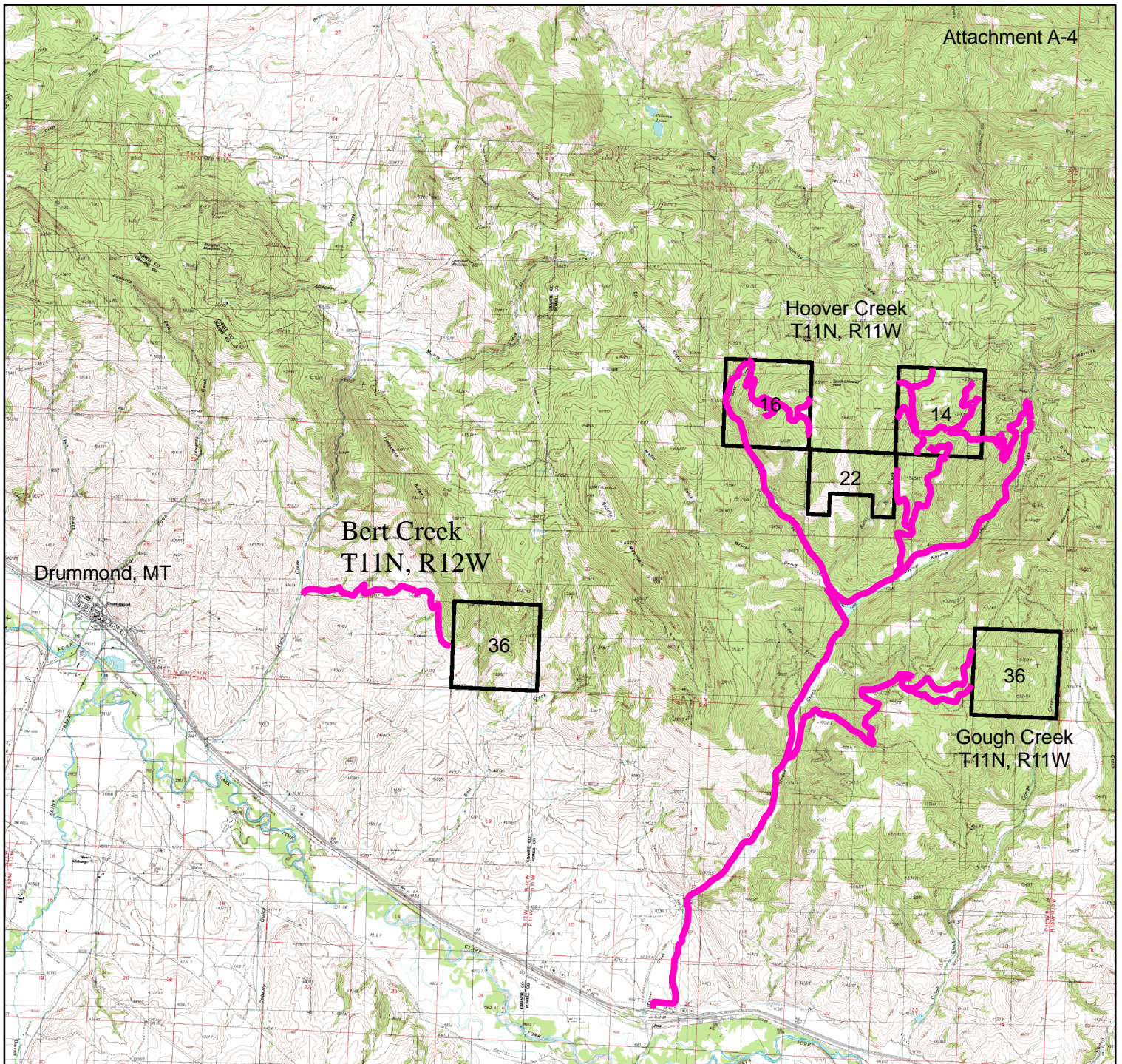


Legend

-  gough access
-  New Road
-  Harvest area
-  State Land

Hoobert Environmental Analysis
Gough Creek
T11N, R11W, Section 36

0 310 620 1,240 1,860 2,480
Feet



Hoobert Timber Sale Vicinity Map

Legend

-  State Land
-  Access Road

0 800 1,600 3,200 4,800 6,400
Feet